



Original Research Article

Levels of Blood Sugar and Glycosylated Hemoglobin (Hb A1c) in Periodontitis with Diabetes Mellitus

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ABSTRACT

Background: Diabetes mellitus is a common and growing global health problem leading to several complications. Among these periodontal diseases are considered as the “sixth complication of diabetes mellitus”. This study reviews the relationship between diabetes and oral health, particularly focusing on periodontal diseases. Periodontitis is more prevalent and severe in patients with diabetes than in normal population. **Materials and Methods:** A total of 30 periodontitis patients with diabetes mellitus were selected for the study. Fasting blood sugar and Glycosylated hemoglobin level were compared with 30 healthy non-diabetics, non-periodontitis subjects. Fasting blood sugar & Glycosylated hemoglobin were done by semi auto-analyzer diagnostic kit. **Results:** Fasting blood sugar and Glycosylated hemoglobin were higher than in control subjects. Statically analysis showed that periodontitis with at least one tooth that displayed a probing pocket depth of $>$ or $=$ 6mm was significantly associated with higher blood sugar ($P=0.005$) and positive correlations were found between mean periodontal disease and HbA1c ($P = 0.009$). **Conclusion:** Periodontal disease and diabetes mellitus are closely associated and are highly prevalent chronic disease with many similarities in pathobiology. A periodontal disease is a risk factor for diabetes mellitus. Diabetes can lead to several health complications, including periodontal disease. Periodontal disease or gum disease is one of the most common causes of teeth loss among diabetic patients.

Key words: Diabetes mellitus, periodontal disease, inflammation.

INTRODUCTION

Diabetes mellitus (DM) is a systemic disease with several major complications affecting both the quality and the length of life. ⁽¹⁾ Diabetes is certain to be one of the most challenging health problems in the 21st century. It is now one of the most common non-communicable diseases globally. Diabetes is the fourth leading cause of death in most developed countries, and there is substantial evidence that it is

epidemic in many developing and newly industrialized nations. ⁽²⁾

India leads the world today with the largest number of diabetics in any given country. In the 1970s, the prevalence of diabetes among urban Indians was reported to be 2.1%, and this has now risen to 12.1%. According to the World Health Organization (WHO) projections, the present 30 million to 33 million diabetics in India will go up to 74 million by 2025. The WHO has issued a

warning that India will be the "Diabetes Capital of The World". (3)

Diabetes mellitus is a common and growing global health problem leading to several complications such as Microangiopathy, Neuropathy, Nephropathy, Microvascular disease, Delayed wound healing. (4) Among these periodontal diseases are considered as the "sixth complication of diabetes mellitus". (5) Periodontitis is the serious and advanced stage of gum disease which includes bone loss. Periodontitis is irreversible. The gum tissue and bone that surround and supports our teeth could become seriously damaged and the teeth affected could become loose and fall out. Periodontitis occurs when the early stage of periodontal disease, gingivitis, is left untreated. Periodontitis has also been linked to serious health problem such as diabetes, heart disease etc.

This study reviews the relationship between diabetes and oral health, particularly focusing on periodontal diseases. Periodontitis is more prevalent and severe in patients with diabetes than in normal population. A periodontal disease is a risk factor for diabetes mellitus. (6) Periodontitis and diabetes are associated with each other. (7)

MATERIALS AND METHODS

The study protocol was in keeping with the ethical guidelines of the 1975 declaration of Helsinki and all the patients gave written informed consent to the study. Patients were selected from those who had

visited department of Periodontics Govt. Medical College, Indore.

A total of 30 periodontitis patients with diabetes mellitus were selected for the study. Fasting blood sugar and Glycosylated hemoglobin level were compared with 30 healthy non-diabetics, non-periodontitis subjects. Fasting blood sugar & Glycosylated hemoglobin were done by semi auto-analyzer diagnostic kit.

OBSERVATIONS & RESULTS

TABLE 1 2005 American Diabetes Association Criteria for the Diagnosis of Diabetes Mellitus

	Normal	Diabetes
Fasting plasma glucose (mg/dl)	<100	≥126
Casual plasma glucose (mg/dl)		≥200 plus symptoms of diabetes
2-hour PG* (mg/dl)	<140	≥200

*2-hour postload glucose (PG) using the 2-hour oral glucose tolerance test

TABLE 2 Correlation between HbA1c Levels and Mean Plasma Glucose Levels

HbA1c (%)	Mean Plasma Glucose (mg/dl)
6	135
7	170
8	205
9	240
10	275
11	310
12	345

The HbA1c test provides an estimate of the average glucose level over the 30 to 90 days preceding the test. It does not account for short-term fluctuations in plasma glucose levels.

TABLE 3 American Diabetes Association Recommendations for HbA1c Levels

HbA1c (%)	Interpretation
<6	Normal value
<7	Treatment goal for patient with diabetes; diet, exercise, and/or medications should control glucose levels well enough to maintain HbA1c values <7%
>8	Physician intervention in diabetes management regimen is recommended to improve glycemic control

TABLE 4 Comparison between normal healthy controls and periodontitis with diabetes mellitus.

S. No.	Parameters	Normal healthy controls N=30	Periodontitis with diabetes mellitus N=30	P-Value
		Mean ± S. D.	Mean ± S. D.	
1	Fasting blood sugar	87.8±10.2	132.2±14.8	0.005*
Per cent				
2	HbA _{1c} (Per cent)	5.4	8.2	0.009*

Note:- * Significant.

RESULTS

Fasting blood sugar and Glycosylated hemoglobin were higher than in control

subjects. Student “t” test analysis showed that periodontitis with at least one tooth that displayed a probing pocket depth of > or = 6mm was significantly associated with higher blood sugar (P=0.005) and positive correlations were found between mean periodontal disease and HbA1c (P = 0.009)

DISCUSSION AND CONCLUSION

Periodontal disease and diabetes mellitus are closely associated and are highly prevalent chronic disease with many similarities in pathobiology. A periodontal disease is a risk factor for diabetes mellitus. According to reports published by the World Health Organization, nearly 4.4% of the world population will be suffering from diabetes by 2030. Diabetes can lead to several health complications, including periodontal disease. Periodontal disease or gum disease is one of the most common causes of teeth loss among diabetic patients.

In our study, we concluded that the diabetes mellitus and periodontitis are positively correlated with to each other. Some finding is reported by aruna et.al (8) and lacopino AM et.al (1), who also reported positively correlation between diabetes mellitus and periodontitis. Related antecedent conditions including obesity and insulin resistance may play an important role in this relationship. Inflammation is a critical player in the association, and its importance is just now coming to light. Diabetes clearly increases the risk of periodontal diseases, and biologically plausible mechanisms have been demonstrated in abundance. Less clear is the impact of periodontal diseases on glycemic control of diabetes and the mechanisms

through which this occurs. It is possible that periodontal diseases may serve as initiators or propagators of insulin resistance in a way similar to obesity, thereby aggravating glycemic control. Further research is needed to clarify this aspect of the relationship between periodontal diseases and diabetes.

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