

A COMPARISON BETWEEN TYPE-2 DIABETICS AND NON-DIABETICS IN TERMS OF PAPILLARY BLEEDING INDEX (PBI)

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ABSTRACT:

OBJECTIVES:

The purpose of this study was to compare the Type 2 diabetes mellitus patients and non-diabetics in terms of Papillary bleeding index (PBI) of periodontal disease.

METHODOLOGY:

This comparative cross-sectional study was conducted during the period of November 2020 to February 2021 in three (3) tertiary care hospitals of Peshawar. The sampling technique was purposive sampling. The sample comprised 105 individuals, 56 participants in Type-2 diabetes group and 49 in non-diabetes group. Male and females, having age between 40-65 years were recruited. Each diabetic and non-diabetic were clinically examined for periodontitis. Age and sex-matched participants suffering from periodontitis without a history of diabetes as well as with good glycemic control (HbA1c) were considered as controls subjects. Glycated hemoglobin (HbA1c) was carried out for all the participants free of cost by using Human GmbH-Max-Planck-Ring 21-65205 Wiesbaden-Germany kit. The study was approved by the ethical committee of the Peshawar Medical College. Data was analyzed using software package SPSS version 20.

RESULTS:

Out of 56 diabetics, 24 subjects brushed once daily, 15 brushed twice daily, 11 brushed occasionally and 6 didn't brush whereas in 49 non diabetics, 20 subjects brushed once daily, 13 brushed twice daily, 11 brushed occasionally and 5 didn't brush. The clinical parameter mean (PBI) was recorded in our study. Score was 2.09 (± 0.82) in diabetics and 1.02 (± 0.47) in non-diabetics. P-value measured by the chi square test was significant. Spearman correlation test was performed to explore the association between the type 2 diabetes and Papillary bleeding index (PBI).

CONCLUSION:

We concluded that a significant difference exists between the mean PBI scores of Type 2 diabetics and non-diabetics.

KEYWORDS: Type-2 Diabetes Mellitus, Periodontal Disease, Glycated Hemoglobin

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INTRODUCTION:

“Diabetes Mellitus (DM) is a metabolic disorder of multiple etiologies characterized by chronic hyperglycemia with disturbances in carbohydrate, fat and protein metabolism. It arises from the defects in insulin secretion, action or both”¹. The disturbance in metabolism causes the sugar level in the blood to rise, which affects different systems of the human body. Diabetes mellitus is classified into three types depending upon the clinical staging and etiology as suggested by Kuzuya and Matsuda; Type 1 diabetes mellitus (DM) or Insulin dependent diabetes mellitus (IDDM), earlier known as juvenile onset diabetes. Type 2 diabetes mellitus, formerly known as non-insulin dependent diabetes mellitus (NIDDM) or adult onset diabetes. Type III diabetes also known as gestational diabetes mellitus (GDM), demarcated as hyperglycemia that is first recognized during pregnancy². One of the most common infections in human beings is periodontitis³. Between the two foremost dental issues; affecting humans worldwide, periodontitis has a higher prevalence rate⁴. Periodontal disease is a common condition characterized by bleeding from gingiva in its initial stages⁵. Generally papillary bleeding is used to indicate the onset of periodontal diseases, and is considered to be an authentic predictor of gingival swelling, that is one of the manifestations of periodontal disease. In addition it is also believed that papillary bleeding also acts as an etiological factor of periodontal attachment loss, which results in periodontitis⁶. Papillary bleeding index was introduced by Loesche that is used to record gingival bleeding with the help of a triangular-shaped wooden toothpick that is used to stimulate the interproximal gingival tissues⁷. Chronic inflammatory mediators and metabolic imbalance affecting the immune system led to infections and development of gingival bleeding in diabetics.

Deposition of advanced glycation end products (AGEs) in gingiva of the diabetics is the major source of periodontitis and papillary bleeding⁸. Diabetes mellitus and periodontal disease, both are chronic inflammatory conditions and the association that exists between the two is bi directional⁹. Diabetes mellitus has been established as a major risk factor for periodontitis¹⁰. The American Society of Diabetes has termed periodontal disease as one of major complications of diabetes¹¹. Periodontal disease is affected by the variances in culture and geographic location¹². Although the effects of type 2 diabetes mellitus on periodontal health have been studied extensively worldwide, there is scarcity of comparative data in the local settings. Therefore this comparative study was conducted in the diabetic (Type-2) population of the Peshawar to compare Type 2 diabetes mellitus patients and non-diabetics in terms of a clinical parameter (Papillary Bleeding Index) of periodontal disease.

METHODOLOGY:

This comparative cross-sectional study was carried out in three (3) tertiary care hospitals of Peshawar: Prime Teaching hospital, Peshawar Dental hospital, and Sardar Begum Dental hospital during the period of November 2020 to February 2021. Patients suffering from Type 2 diabetes mellitus and periodontitis, visiting the Periodontology departments were included. Non-diabetics, having periodontitis visiting the Periodontology department were recruited as controls. Male and females, having age between 40-65 years were recruited. Exclusion criteria were pregnant females; age less than 40 years, smokers, hypertensive and Type 1 diabetes mellitus patients. Individuals having less than 40 years of age were excluded because type 2 diabetes is less common in that age group¹³. Similarly smoking and hypertension, being the risk factor for periodontal disease, may confound the results of the present study; therefore smokers and people suffering from hypertension were excluded from the study. The sample size of present comparative cross sectional study was 105 with 95% confidence level, two-sided significance level (α) of 0.05 to detect the Odds ratio (OR) of 5.5 calculated from previous research (Susanto H et al.2011). 56 diabetics and 49 non-diabetics were recruited for our study. Age, gender, socioeconomic status, education level and frequency of oral hygiene measures were matched

to minimize the confounding effect of these factors. Purposive sampling technique was used for the selection of participants. Each diabetic and non-diabetic patient was clinically examined for papillary bleeding through Papillary Bleeding Index (PBI). Periodontal examination to record Papillary Bleeding Index (PBI) of all subjects was carried out in Periodontology department of different hospitals. Determination of Glycated hemoglobin (HbA1c) was carried out for all the participants, free of cost, by using Human Gmbh-Max-Planck-Ring 21-65205 Wiesbaden-Germany kit. Participants having Glycated hemoglobin (HbA1c) level of less than 6.5 were considered as non-diabetics whereas those having levels of 6.5% or higher were considered as diabetics. Papillary bleeding index was calculated on medial and dental surface of Ramfjord teeth. Ramfjord recommended the assessment of six „index teeth“ that soon became known as the „Ramfjord teeth“. These teeth (with the notation of the Fédération Dentaire Internationale) are: maxillary right first molar (tooth 16), maxillary left central incisor (tooth 11), maxillary left first bicuspid (tooth 24), mandibular left first molar (tooth 36), mandibular right central incisor (tooth 41) and mandibular right first bicuspid (tooth 44)¹⁴. Score was calculated and mean was taken. Data was analyzed using software package SPSS version 20.

RESULTS:

Table 1: Demographic Characteristics

Characteristics	Cases (Diabetics) (n)	Controls (Non-Diabetics) (n)	Total (n)
Age Group			
40-45	16	14	30
46-50	8	7	15
51-55	11	10	21
56-60	17	15	32
61-65	4	3	7
Gender			
Male	20	1	33
Female	36	36	72
Socioeconomic Status			
High	18	16	34
Low	38	33	71
Education Level			
Middle School	40	34	74
High School	9	8	17
College	7	7	14

Table 2: Diabetes and Mean Papillary Bleeding Index Score among Sample (n=105)

Parameter	Cases Mean±SD (n=56)	Controls Mean±SD (n=49)	P-value
PBI	2.09±0.82	1.02±0.47	^a 0.0002*

a=P value measured by Chi square test.

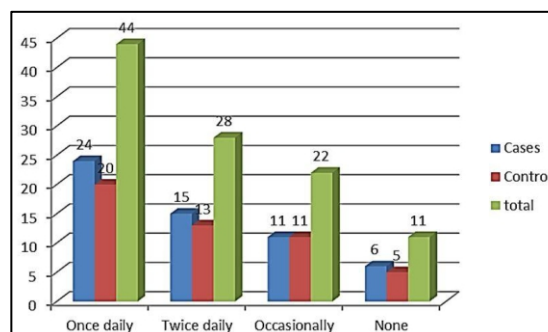


Figure 1: Daily Frequency of Cleaning Teeth

Table 3: Diabetes Status and Papillary Bleeding Index among Sample (n=105)

Diabetes Status	Papillary Bleeding Index				Total
	Normal	Mild	Moderate	Severe	
Type-2 Diabetics	0	16	19	21	56
Non-Diabetics	11	36	2	0	49
Total	11	52	21	21	105

Table 4: Type-2 Diabetes Mellitus and Severity Level of Papillary Bleeding Index (PBI)

Parameters	Diabetes Status	
	r _s	P
Papillary Bleeding Index (PBI)	0.701	.000*

r_s= Spearman's Rank Correlation Coefficient

DISCUSSION:

Diabetes mellitus is considered to be one of the important factors involved in promoting the risk for the diseases of oral periodontium¹⁵. Molina et al, reported that almost every parameter of periodontal disease is adversely affected by diabetes¹⁶. In the present study, the factors like age; gender, socioeconomic status, education level and frequency of oral hygiene measures were matched between the groups (Table 1, Figure 1). These factors may confound the results of the research, as these are strongly associated with periodontal disease. Di Spirito F et al, reported the possible association of age and gender with the periodontal disease¹⁷. Many other studies conducted at different geographic locations and in different times also reported similar

relationships¹⁸. Kumari M et al, reported a relationship between the socioeconomic status and education level with the severity level of periodontal disease¹⁹. High education level was found to be significantly related ($P<.0001$) to severity level of periodontitis in both White and Black Americans whereas high income was significant ($P<.0001$) in Whites. Some other studies have also reported the association of socioeconomic status and periodontal disease²⁰. The correlation analysis in our study found a strong association between diabetes and papillary bleeding index ($r_s=0.701$) (Table 4). The mean Papillary Bleeding Index (PBI) score recorded in our study is 2.09 ± 0.82 in diabetics (cases) whereas the mean score is 1.02 ± 0.47 in non-diabetic (control) group. The difference between the two groups is significant with a p -value= 0.0002 (Table 2). This result is in accordance with the results of a study by Sanz M et al²¹. Higher bleeding scores in diabetics as compared to non-diabetic control is also reported by Pant et al although some investigators used other methods instead of Papillary Bleeding Index (PBI)²². Ratna NA et al, reported a significantly higher score for bleeding on probing in diabetics as compared to non-diabetics²³. Significantly higher values of Papillary Bleeding Index (PBI) scores in our study represent an augmented response of the gums in the cases. This can be explained by the fact that the normal gingival flora mostly consist of gram positive organisms but in diabetes the bacterial flora is altered and gram negative microorganisms become predominant. In addition, the alteration in host defense mechanism results in altered neutrophil behavior and consequently more inflammatory mediators and cytokines are produced. The cumulative result of these changes is an increase in bleeding from gingiva and inflammation.

CONCLUSION:

It was concluded that Type 2 diabetics have significantly higher Papillary bleeding index when compared with non-diabetics of same age, gender, socioeconomic status, education level and oral hygiene measures.

LIMITATIONS:

The present study was a hospital-based retrospective study. Longitudinal and community based studies are required to obtain more generalizable findings.

CONFLICT OF INTEREST: None

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