

# PERIODONTAL HEALTH LITERACY AMONG TYPE 2 DIABETES MELLITUS PATIENTS SUFFERING FROM CHRONIC PERIODONTITIS

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## ABSTRACT

**Objective:** The aim of the present study is to evaluate the awareness level of diabetic patients in regard to the complications of diabetes and specifically periodontitis as a complication of diabetes in Peshawar city of Pakistan with the target of improving oral health education in the population.

**Materials and Methods:** A cross-sectional questionnaire-based study was conducted among 151 Type 2 Diabetes mellitus patients attending periodontology department of Khyber college of dentistry Peshawar Pakistan to assess the level of their awareness about complications of diabetes specifically periodontitis as a complication of type 2 DM.

**Results:** The general level of the Type 2 DM patients regarding complications of diabetes including Eye disease, Kidney disease, gangrene foot, heart disease and stroke was found satisfactory as compared to periodontitis as a complication of diabetes which was found unsatisfactory in this study.

**Conclusion:** Majority of the Type 2 DM patients were aware about the complications of Type 2 DM except periodontitis which is also a complication of Type 2 DM. Therefore, awareness through and among health professionals both Medical and Dental including patients and general public on this issue should be spread through Oral health awareness programs for the general wellbeing of the population.

**Keywords:** Type 2 Diabetes Mellitus, Periodontal health awareness, Periodontitis

## INTRODUCTION

Diabetes mellitus (DM) is a chronic disease caused by inherited and/or acquired deficiency in production of insulin by the pancreas, or by the ineffectiveness of the insulin produced. Such a deficiency results in increased concentrations of glucose in the blood, which in turn damage many of the body's systems, in particular the blood vessels and nerves.<sup>1</sup>

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People living with type 2 DM are more vulnerable to various forms of both short- and long-term complications, which often lead to their premature death. This tendency of increased morbidity and mortality is seen in patients with type 2 DM because of the commonness of this type of DM, its insidious onset and late recognition.<sup>2</sup> Diabetes mellitus is a systemic disease with several major complications affecting both the quality and length of life. One of these complications is periodontal disease (periodontitis).<sup>3</sup> Periodontitis is much more than a localized oral infection. Recent data indicate that periodontitis may cause changes in systemic physiology. The interrelationships between

periodontitis and diabetes provide an example of systemic disease predisposing to oral infection, and once that infection is established, the oral infection exacerbates systemic disease. In this case, it may also be possible for the oral infection to predispose to systemic disease.<sup>4</sup>

Studies have revealed possible link between periodontitis and different systemic diseases. Periodontitis is a constant potential source of infection and has been considered as a separate risk factor for some cardiovascular, respiratory, endocrine (Diabetes Mellitus), musculoskeletal, and reproductive system related abnormalities.<sup>5</sup> Epidemiological data confirm that diabetes is a major risk factor for periodontitis; susceptibility to periodontitis is increased by approximately threefold in people with diabetes. There is a clear relationship between degree of hyperglycaemia and severity of periodontitis.<sup>6</sup> There is emerging evidence to support the existence of a two-way relationship between diabetes and periodontitis, with diabetes increasing the risk for periodontitis, and periodontal inflammation negatively affecting glycaemic control.<sup>7</sup>

Diabetic patients are found to have little knowledge of their increased risk for chronic periodontitis. In order to promote proper oral health and to reduce the risk of chronic periodontitis, health professionals in both the dental and medical fields need to take the responsibility to develop programs to educate the public about the oral manifestations of diabetes and its complications on oral health. To reduce morbidity and mortality, awareness regarding diabetes and its complications is necessary among diabetic patients and health professionals in both the dental and medical field. The specific aim of this study was to assess the literacy (knowledge, attitude) about chronic periodontitis as a complication of type 2 diabetes among type 2 diabetic patients.

## MATERIALS AND METHODS

In this cross sectional study, a pretested questionnaire was used for the participants attending periodontology department of Khyber college of dentistry Peshawar Pakistan from July 2019 to December 2019. A structured questionnaire based on '8' close ended questions was designed after an intensive review of the literature on association between diabetes and chronic periodontitis. The questionnaire was pre-tested before use in the field to investigate

to what extent participants could easily understand its content. The validation of the questionnaire was regulated by means of face validation, content validation, reliability, and consistency tests by piloting it on 30 participants. As the questionnaire appeared to be easily understood, therefore, no changes were made.

The study was carried out after the approval by Research Ethics Committee of Khyber College of Dentistry Peshawar Pakistan. The objective of the study was explained to each participant and a verbal informed consent was obtained. The responses to the questionnaires was kept entirely confidential and identity was not required on the questionnaires. Adults aged 18 years and above, both genders, non-smokers, diagnosed with type 2 diabetes mellitus (Type 2 diabetes Mellitus patients were diagnosed according to World Health Organization criteria: Fasting blood glucose level  $\geq 126$  mg/dl or an HbA1c of 6.5% (8) from at least last one year attending a diabetic clinic in Pakistan, having no other systemic illness, minimum 50% teeth should be present and diagnosed with generalized chronic periodontitis, no Periodontal treatment during the last 6 months, not using any systemic antibiotics at the time of study nor used it during last 6 months were included in the study. Smokers, pregnant females and participants not willing to participate in the study were excluded.

## Statistical analysis

The sample size was calculated using Daniel (1999) formula for sample size (9) which is well established in literature. The sample size was calculated with 95% level of confidence of 95% and 5% precision. By taking the prevalence of diabetes mellitus by 11.77 % in Pakistan (10),  $p=0.11$  while  $Z=1.96$  (for 95% level of confidence), and  $d= 0.05$ .

$$n = \frac{z^2 p(1-p)}{d^2} \quad n = \text{population size, } Z = Z \text{ statistic for a level of confidence}$$

$P$  = expected prevalence or proportion,  $d$  = precision

the total sample size required for this cross sectional study was 151 participants.

All analysis was performed using Statistical Package for Social Sciences version 22. Descriptive statistical analysis has been carried out in this study and the significance level is assessed at 5% level of

significance. Chi-square test has been used to find the significance of study parameters on categorical scale between two or more groups.

**RESULTS**

Out of total 151 patients, (94.7%) patients revealed that they know about the complications of type 2 DM including (37.7%) male and (56.9%) female where as a very few (4.6%) said that they don't know about the complications of Type 2 DM (Table 1).

Education level of the participants in this study varied from level 'No education/Below secondary' upto 'above secondary school level' with the majority (62.2%) belonging to 'No education/Below secondary' level whereas education level of 'above secondary school' was (37.7%). When education level was correlated with knowledge about complications of type 2 DM, it was revealed that participants (59.6 %) from level 'No education/Below secondary' was significantly aware about the complications of Type

2 DM (table 2).

The percentage of participants who were aware of complications of Eye disease was 93.5%, kidney disease was 96%, Gangrene foot was 94%, heart disease was 98%, stroke was 97% and periodontitis was 34% only (table 3).

Upon asking, have you ever told by your physician that you should be extra careful about your oral health and see a dentist often because you have diabetes, 94.7% replied in 'No' and 5.3% replied in 'Yes' (Fig .1)

**DISCUSSION**

Globally, an estimated 422 million adults were living with diabetes in 2014, compared to 108 million in 1980.<sup>11</sup> The global prevalence (age-standardized) of diabetes has nearly doubled since 1980, rising from 4.7% to 8.5% in the adult population.<sup>12</sup> This reflects an increase in associated risk factors such as being overweight or obese. Over the past decade, diabetes prevalence has risen faster in low- and mid-

**Table 1: Gender of patient \* Do patient know about complications of DM**

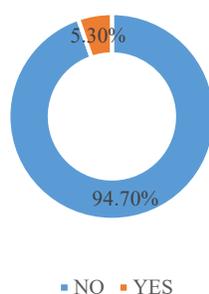
		Patient's Knowledge About Complications of Dm			Total
		Yes	No	Don't Know	
Gender Of Patient	Male	57 (37.7%)	0	1	58
	Female	86 (56.9%)	1	6	93
Total		143	1	7 (4.6%)	151

**Table 2: Education level of Patient \* Do patient know about complications of DM**

		Do Patient Know About Complications of Dm			Total
		Yes	No	Don't Know	
Education Loevel of Patient	Uneducated/ Below Secondary	90 (59.6%)	1	3	94 (62.2%)
	Above Secondary School	53 (35%)	0	4	57 (37.7%)
	Total	143	1	7	151

**Table 3: Awareness about Complications of Type 2 DM**

COMPLICATION OF TYPE2 DM	AWARENESS
EYE DISEASE	93.5%
KIDNEY DISEASE	96%
GANGRENE FOOT	94%
HEART DISEASE	98%
STROKE	97%
PERIODONTITIS	34%



**Fig 1: Physician's referral to Dentists**

dle-income countries than in high-income countries. Diabetes caused 1.5 million deaths in 2012.<sup>13</sup> Higher-than-optimal blood glucose caused an additional 2.2 million deaths, by increasing the risks of cardiovascular and other diseases. Forty-three percent of these 3.7 million deaths occur before the age of 70 years. The percentage of deaths attributable to high blood glucose or diabetes that occurs prior to age 70 is higher in low- and middle-income countries than in high-income countries.<sup>14</sup>

The current prevalence of type 2 diabetes mellitus in Pakistan is 11.77%. In males the prevalence is 11.20% and in females 9.19%. The mean prevalence in Sindh province is 16.2% in males and 11.70 % in females; in Punjab province it is 12.14% in males and 9.83% in females. In Baluchistan province 13.3% among males, 8.9% in females; while in Khyber Pakhtunkhwa (KPK) it is 9.2% in males and 11.60% in females. The prevalence of type 2 diabetes mellitus in urban areas is 14.81% and 10.34% in rural areas of Pakistan. The prevalence is higher in males than females and more common in urban areas compared to the rural areas. Pakistan must include diabetes preventive measures in their national health policy to minimize the burden of the disease.<sup>10</sup>

Studies have revealed possible link between periodontitis and different systemic diseases. Periodontitis is a constant potential source of infection and has been considered as a separate risk factor for some cardiovascular, respiratory, endocrine (Diabetes Mellitus), musculoskeletal, and reproductive system related abnormalities.<sup>5</sup> Epidemiological data confirm that diabetes is a major risk factor for periodontitis; susceptibility to periodontitis is increased by approximately threefold in people with diabetes. There is a clear relationship between degree of hyperglycemia and severity of periodontitis. The mechanisms that

underpin the links between these two conditions are not completely understood, but involve aspects of immune functioning, neutrophil activity, and cytokine biology. There is emerging evidence to support the existence of a two-way relationship between diabetes and periodontitis, with diabetes increasing the risk for periodontitis, and periodontal inflammation negatively affecting glycemic control.<sup>7</sup> Both diabetes and periodontitis are chronic diseases. Diabetes has many adverse effects on the periodontium, including decreased collagen turnover, impaired neutrophil function, and increased periodontal destruction. Diabetic complications result from microvascular and macro vascular disturbances. A great deal of attention has been directed to potential differences in the immunomodulatory responses to bacteria between diabetic and non-diabetic subjects. Neutrophil chemotaxis and phagocytic activities are compromised in diabetic patients, which can lead to reduced bacterial killing and enhanced periodontal destruction.<sup>15</sup>

Numerous investigations have been directed to evaluate the information and familiarity of diabetic patient about oral wellbeing in various nations, yet extremely limited literature exists in Pakistani population. Henceforth, the reason for this study was to assess the awareness level of diabetic patients about their periodontal health so that overall dental health education could be promoted among diabetic patients.

In the present study, majority of the participants (94.7%) were aware about the complications of Type 2 DM. In correlation to education, participants from 'No education/Below secondary' level were significantly aware about the overall complications of Type 2 DM but associated with lack of awareness on association between Type 2 DM and periodontitis which is in accordance to the study conducted by Shanmukappa et al.<sup>16</sup> and Tang et al.<sup>17</sup>

Achieving the essential result of assessing the awareness of Type 2 DM patients about periodontitis as a complication of Type 2 DM, which was found to be lower as compared to other complications which was found higher despite of their educational level and were in accordance to the study conducted by Bakhshandeh et al.<sup>18</sup>

Diabetic patients are found to have little knowledge of their increased risk for oral diseases. In order to promote proper oral health and to reduce the risk of

oral diseases, health professionals in both the dental and medical fields need to take the responsibility to develop programs to educate the public about the oral manifestations of diabetes and its complications on oral health. To reduce morbidity and mortality, awareness regarding diabetes and its complications is necessary among diabetic patients and health professionals in both the dental and medical field.

## CONCLUSION

Awareness should be made among general public including Type 2 DM patients as well as health professionals both Medical and dental regarding the relationship between Type 2 DM and periodontal disease for the better diabetic control by maintaining good oral health. In this regard Oral health awareness programs need to be conducted for general public as well as health care professionals both medical and dental.

## REFERENCES

1. Association AD. Diagnosis and classification of diabetes mellitus. *Diabetes care*. 2010;33(Supplement 1):S62-S9.
2. Olokoba AB, Obateru OA, Olokoba LB. Type 2 diabetes mellitus: a review of current trends. *Oman medical journal*. 2012;27(4):269.
3. Saini R, Saini S, Sugandha R. Periodontal disease: The sixth complication of diabetes. *Journal of Family and Community Medicine*. 2011;18(1):31.
4. Li X, Kolltveit KM, Tronstad L, Olsen I. Systemic diseases caused by oral infection. *Clinical microbiology reviews*. 2000;13(4):547-58.
5. Arigbede AO, Babatope BO, Bamidele MK. Periodontitis and systemic diseases: A literature review. *Journal of Indian Society of Periodontology*. 2012;16(4):487.
6. Jindal A, Parihar AS, Sood M, Singh P, Singh N. Relationship between severity of periodontal disease and control of diabetes (glycated hemoglobin) in patients with type 1 diabetes mellitus. *Journal of international oral health: JIOH*. 2015;7(Suppl 2):17.
7. Preshaw P, Alba A, Herrera D, Jepsen S, Konstantinidis A, Makrilakis K, et al. Periodontitis and diabetes: a two-way relationship. *Diabetologia*. 2012;55(1):21-31.
8. Rohlffing CL, Little RR, Wiedmeyer H-M, England JD, Madsen R, Harris MI, et al. Use of GHb (HbA1c) in screening for undiagnosed diabetes in the US population. *Diabetes care*. 2000;23(2):187-91.
9. Daniel W. *Biostatistics: A Foundation for Analysis in the Health Sciences*, 7th edR Wiley. New York. 1999.
10. Meo SA, Zia I, Bukhari IA, Arain SA. Type 2 diabetes mellitus in Pakistan: Current prevalence and future forecast. *JPMA The Journal of the Pakistan Medical Association*. 2016;66(12):1637-42.
11. Zhou B, Lu Y, Hajifathalian K, Bentham J, Di Cesare M, Danaei G, et al. Worldwide trends in diabetes since 1980: a pooled analysis of 751 population-based studies with 4· 4 million participants. *The Lancet*. 2016;387(10027):1513-30.
12. Whiting DR, Guariguata L, Weil C, Shaw J. IDF diabetes atlas: global estimates of the prevalence of diabetes for 2011 and 2030. *Diabetes research and clinical practice*. 2011;94(3):311-21.
13. Organization WH. *Global report on diabetes: executive summary*. World Health Organization; 2016.
14. Balakumar P, Maung-U K, Jagadeesh G. Prevalence and prevention of cardiovascular disease and diabetes mellitus. *Pharmacological research*. 2016;113:600-9.
15. Grover HS, Luthra S. Molecular mechanisms involved in the bidirectional relationship between diabetes mellitus and periodontal disease. *Journal of Indian Society of Periodontology*. 2013;17(3):292.
16. Shanmukappa SM, Nadig P, Puttannavar R, Ambareen Z, Gowda TM, Mehta DS. Knowledge, attitude, and awareness among diabetic patients in Davangere about the association between Diabetes and Periodontal Disease. *Journal of International Society of Preventive & Community Dentistry*. 2017;7(6):381.
17. Tang YH, Pang SM, Chan MF, Yeung GS, Yeung VT. Health literacy, complication awareness, and diabetic control in patients with type 2 diabetes mellitus. *Journal of advanced nursing*. 2008;62(1):74-83.
18. Bakhshandeh S, Murtomaa H, Vehkalahti MM, Mofid R, Suomalainen K. Oral self-care and use of dental services among adults with diabetes mellitus. *Oral health & preventive dentistry*. 2008;6(4).