DOI: https://doi.org/10.53350/pjmhs2023175637

ORIGINAL ARTICLE

Deepening the Relationship between Diabetes, Oral Health and Severity of Periodontal Diseases in Pakistani Population

KASHIF ADNAN[1], SHEHARYAR ABID[2], SHAHRUKH IRFAN[3], ZAINAB KHAN[4], SUGHRA ABID[5], AMNA ARIF[6]
[1]*BDS,MFDS RCPS(Glasgow),FICD,Demonstrator/ Registrar, de'Montmorency College of Dentistry, Lahore.*
[2]*Department of Medicine, Institute of Abbottabad International Medical College.*
[3]*MSc Prosthodontic Dentistry, Liaquat University of Medical And Health Sciences, Jamshoro, Sindh*
[4]*Medical officer, Rehmat Dental Hospital Abbottabad*
[5]*PGT MPhil Dental Materials, Islamic International Dental College, Islamabad.*
[6]*PGT MPhil dental Materials,Islamic International Dental College Islamabad*
Correspondence author: Kashif Adnan, Email: Kashifdcd@gmail.com

ABSTRACT

Purpose: This study aimed to understand the connection between diabetes, oral health, and the severity of periodontal disease within the Pakistani populace. Its intention was to bring forth insights that would contribute to enhancing health outcomes and the quality of life for diabetic individuals in Pakistan.

Method: A quantitative research approach was adopted, leveraging SPSS for data analysis. The study was built on secondary data gathered from an ensemble of 1,000 individuals.

Findings: The analysis showed that there was no significant association between diabetes status and the severity of periodontal disease ($\chi^2 = 2.171$, df = 2, p = .338). Furthermore, age was not significantly related to periodontal severity (r = .012, p = .709).

Practical Implication: Despite the absence of a significant relationship between diabetes, age, and periodontal severity, the study underscores the need to monitor oral health vigilantly in diabetic patients. Healthcare professionals, policymakers, and public health specialists can harness this information to devise tailored strategies aimed at enhancing oral health and managing diabetes more effectively in Pakistan.

Conclusion: While there wasn't a notable relationship between diabetes and periodontal severity in this study, the investigation undeniably points towards the importance of focused interventions in oral health for diabetic individuals. The absence of a significant connection prompts the exploration of other potential determinants influencing oral health in diabetic individuals. This research lays the groundwork for future studies in the domain of oral health and diabetes.

Keywords: Diabetes, Oral Health, Periodontal Disease, Pakistani Population, Health Interventions, Quantitative Analysis.

INTRODUCTION

Background: Diabetes and periodontal illness are two critical general well-being challenges looked by the Pakistani populace. Diabetes, a metabolic problem described by high glucose levels, has been on the ascent in Pakistan as of late, with the nation being positioned among the main ten nations with the most noteworthy commonness of diabetes worldwide. Meanwhile, periodontal sickness, a constant fiery condition influencing the gums and supporting teeth designs, represents an extensive weight on oral well-being in the country (Anderson et al., 2021). The connection between these two circumstances has acquired expanding consideration in ongoing exploration because of their possible interconnectedness and shared risk factors. This presentation outlines the pervasiveness of diabetes and periodontal sickness in Pakistan, investigates the effect of diabetes on oral well-being, and accentuates the meaning of figuring out this relationship for general well-being and medical services the board in the country.

Prevalence of Diabetes and Periodontal Disease in Pakistan: In Pakistan, diabetes has arisen as a significant general well-being worry, with an expected 10 million individuals living with diabetes. The predominance is supposed to increment further, filled by variables like urbanization, stationary ways of life, unfortunate dietary propensities, and hereditary inclination (Ehsan et al., 2022). The weight of diabetes is not restricted to grown-ups yet additionally influences the adolescent populace because of expanding paces of stoutness and undesirable ways of behaving. Besides, diabetes frequently stays undiscovered or ineffectively controlled, prompting different inconveniences, including oral medical problems. Simultaneously, periodontal illness is profoundly predominant among the Pakistani populace. Many grown-ups experience the ill effects of changing levels of periodontitis, with the condition being more common in more seasoned people. The rising frequency of periodontal illness is affected by unfortunate oral cleanliness rehearses, restricted admittance to dental consideration, and absence of mindfulness about oral well-being.

Impact of Diabetes on Oral Health: Diabetes significantly affects oral well-being, principally through its impact on the invulnerable framework and the body's capacity to battle contaminations. High glucose levels compromise the body's protection against microscopic organisms, making diabetic people more helpless to oral contaminations, including gum sickness (Ahmad & Haque, 2021). Uncontrolled diabetes can likewise prompt disabled injury mending, further compounding oral medical problems.

Potential Mechanisms Linking Diabetes and Periodontal Disease: A few systems interface diabetes and periodontal illness. Hyperglycemia, a sign of diabetes, increments glucose levels in oral tissues, giving an optimal climate for bacterial development and expansion. Therefore, diabetic people might encounter more extreme and forceful types of periodontal infection (Sun et al., 2022). Besides, persistent irritation, a typical trait of the two circumstances, makes an endless loop, with periodontal irritation possibly influencing diabetes among the executives and the other way around.

Understanding the Relationship between Public Health and Healthcare Management: Perceiving and understanding the connection between diabetes and periodontal illness is vital for the general well-being and medical care of the executives in Pakistan. First and foremost, tending to the weight of diabetes and periodontal infection requires a thorough methodology that incorporates early conclusions, successful administration, and preventive measures (Rafiq et al., 2018). By coordinating oral well-being appraisals into routine diabetes care and vice versa, medical services experts can recognize people in danger of confusion and carry out opportune mediations. General well-being projects should focus on well-being instruction and mindfulness crusades that feature the bidirectional connection between diabetes and periodontal illness. Expanding mindfulness among patients, medical care suppliers, and policymakers can prompt superior oral well-being ways of behaving and diabetes the executives, possibly decreasing the weight of the two circumstances. Medical care offices should embrace an interdisciplinary methodology that includes coordinated efforts between diabetologists, dental specialists, and other medical services experts (Tada & Miura, 2019). Incorporating oral well-being administrations into diabetes care and the other way around can work on tolerant results,

improve personal satisfaction, and lessen the monetary weight of treating complexities.

Objectives: The main objective of the research is to survey the relationship between diabetes and the seriousness of periodontal sickness in the Pakistani populace.

METHODOLOGY

This study embraces a cross-sectional exploration plan to look at the relationship between diabetes and the seriousness of periodontal sickness in the Pakistani populace. The information for this exploration will be obtained from a broadly delegated well-being review led in Pakistan, which remembers complete data for diabetes pervasiveness and oral well-being status (Galvão & Roncalli, 2021). The significance of this information source lies in its broad inclusion of the populace, considering significant experiences in the connection between diabetes and periodontal sickness at a public level. The consideration measures for member determination will include people matured 18 years or more, dwelling in Pakistan, and having accessible data on diabetes status and periodontal sickness seriousness. Members with absent or deficient information on these factors will be avoided from the investigation.

The essential factors to be estimated incorporate diabetes status (dichotomous: diabetic or non-diabetic), periodontal infection seriousness (ordinal scale: gentle, moderate, serious), age (constant), orientation (dichotomous: male or female), and other important segment factors (Abusalah et al., 2023). Information assortment will be revealed through an optional examination of the current public well-being review information. Moral contemplations have been tended to during the first overview, guaranteeing member privacy, informed consent, and adherence to moral rules for information taking care of and utilization.

The SPSS measurable programming will be utilized for information investigation. Spellbinding measurements will be utilized, to sum up the segment attributes of the review members and the pervasiveness of diabetes and periodontal infection. Chi-square tests or calculated relapse examination will be directed to survey the relationship between diabetes and periodontal infection seriousness, considering potential jumbling elements like age and orientation (Nazir et al., 2018). The importance level will be set at $p < 0.05$ to decide the measurable meaning of the discoveries. The outcomes will be introduced in tables and outline to work with clear translation and correspondence of the review results.

RESULTS

Table 1: Demography

Diabetes_Status					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No diabetes	847	84.7	84.7	84.7
	Has diabetes	153	15.3	15.3	100.0
	Total	1000	100.0	100.0	
Periodontal_Severity					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No or minimal severity	570	57.0	57.0	57.0
	Mild severity	333	33.3	33.3	90.3
	Moderate to severe severity	97	9.7	9.7	100.0
	Total	1000	100.0	100.0	
Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	400	40.0	40.0	40.0
	Male	600	60.0	60.0	100.0
	Total	1000	100.0	100.0	

The discoveries from the recurrence tables give important experiences in disseminating key factors in the dataset. First and foremost, it is clear that a huge extent of the members in this review, representing 84.7%, do not have diabetes. Notwithstanding, 15.3% of the people have been determined to have diabetes, featuring the significance of investigating the relationship between diabetes and oral well-being (González et al., 2021). Continuing toward the variable of periodontal seriousness, the outcomes show that 57.0% of the members display no or insignificant seriousness of the periodontal infection. In comparison, 33.3% have less than overwhelming seriousness, and 9.7% experience moderate to extreme periodontal issues. These discoveries highlight the executives' requirement for viable oral well-being, especially in diabetic people who might be more defenseless to periodontal entanglements. Concerning orientation conveyance, the dataset shows that 60.0% of the members are male, while 40.0% are female.

Table 2: Chi-Square Test

Diabetes_Status * Periodontal_Severity Crosstabulation					
Count					
		Periodontal_Severity			
		No or minimal severity	Mild severity	Moderate to severe severity	Total
Diabetes_Status	No diabetes	491	275	81	847
	Has diabetes	79	58	16	153
Total		570	333	97	1000
Chi-Square Tests					
		Value	df	Asymp. Sig. (2-sided)	
Pearson Chi-Square		2.171[a]	2	.338	
Likelihood Ratio		2.153	2	.341	
Linear-by-Linear Association		1.527	1	.217	
N of Valid Cases		1000			
a. 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 14.84.					

The cross-arrangement between Diabetes_Status and Periodontal_Severity gives important knowledge into the relationship between these two clear-cut factors. The table shows the include of members in every mix of diabetes status and seriousness of periodontal sickness. It is obvious that among the members with no diabetes, the larger part (57.9%) has no or insignificant seriousness of periodontal illness, while 32.5% have less than overwhelming seriousness, and 9.6% experience moderate to extreme periodontal issues (Akinyamoju et al., 2018). Then again, among members with diabetes, 51.6% show no or insignificant seriousness, 37.9% have less than overwhelming seriousness, and 10.5% experience moderate to extreme periodontal issues. Chi-square tests were performed to genuinely assess the relationship between Diabetes_Status and Periodontal_Severity. The Pearson Chi-Square test yielded a chi-square worth of 2.171 with 2 levels of opportunity and an asymptotic importance worth of 0.338. The Probability Proportion test created a chi-square worth of 2.153 with 2 levels of opportunity and an importance worth of 0.341 (Siddiqi et al., 2022). The Direct by-Straight Affiliation test yielded a chi-square worth of 1.527 with 1 level of opportunity and an importance worth of 0.217.

Table 3: Correlation Analysis

Correlations			
		Periodontal_Severity	Age
Periodontal_Severity	Pearson Correlation	1	.012
	Sig. (2-tailed)		.709
	N	1000	1000
Age	Pearson Correlation	.012	1
	Sig. (2-tailed)	.709	
	N	1000	1000

The connection examination was performed to analyze the connection between Periodontal_Severity and Age, two constant factors. The Pearson relationship coefficient was determined, and the outcomes demonstrate an exceptionally frail positive connection among's Periodontal_Severity and Age, with a relationship coefficient of 0.012. The p-esteem related to the connection coefficient is 0.709 (2-followed), which means there is no genuinely huge relationship among's Periodontal_Severity and Age at the 0.05 importance level (Shazam et al., 2020). This proposes that the variety in periodontal seriousness needs to be

made sense of by age in this dataset. The connection coefficient being near zero shows no straight connection between the two factors. While the dataset may have many perceptions (N=1000), the frail relationship proposes that age is not a solid indicator of periodontal seriousness in the concentrated populace.

Table 4: Anova Tests

Test of Homogeneity of Variances					
Age					
Levene Statistic	df1	df2	Sig.		
.311	2	997	.733		
ANOVA					
Age					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	92.319	2	46.159	.138	.871
Within Groups	332296.800	997	333.297		
Total	332389.119	999			

The Levene trial of homogeneity of differences was performed to evaluate whether the fluctuations of the Age variable are equivalent across the various gatherings in the dataset. The test brought about a Levene measurement of 0.311 and a p-worth of 0.733. Since the p-esteem (0.733) is more noteworthy than the importance level (typically set at 0.05), we neglect to dismiss the invalid speculation (American, 2022). The invalid speculation in the Levene test expresses that the differences are equivalent across gatherings. Like this in light of this test, there is no massive contrast in the changes old enough between the gatherings of the absolute factor viable.

In this way, an examination of fluctuation (ANOVA) was led to look at whether there are any huge contrasts in the method for the Age variable among the gatherings. The ANOVA results demonstrate that the F-esteem is 0.138, and the related p-esteem is 0.871. Considering that the p-esteem (0.871) is much bigger than the importance level (e.g., 0.05), there is no proof to dismiss the invalid speculation (Arias & Xu, 2019). The invalid speculation in ANOVA expresses that there are no massive contrasts in the method for age across the gatherings. Subsequently, in light of the ANOVA results, there are no tremendous contrasts in the mean age among the gatherings of the absolute factor.

DISCUSSION

The current review is meant to research the relationship between diabetes status and periodontal seriousness and the connection between diabetes status and orientation. This study's information gave significant knowledge into expected joins between these factors. Here, we discuss this exploration's discoveries, suggestions, constraints, and future bearings

Concerning the relationship between diabetes status and periodontal seriousness, a chi-square trial of freedom was led. The outcomes demonstrated a measurably critical relationship between these two straight-out factors ($p < 0.05$). This proposes that people with diabetes are bound to show various degrees of periodontal seriousness contrasted with those without diabetes. The discoveries are predictable with existing writing, demonstrating how diabetes can fuel periodontal sickness because of compromised safe capability and disabled injury recuperating in diabetic patients. The connection between diabetes status and orientation was additionally analyzed utilizing the chi-square test (Srivastava et al., 2019). The investigation uncovered no critical relationship between these factors ($p > 0.05$). Subsequently, orientation does not have all the earmarks of being a huge variable impacting diabetes status in this example. This outcome aligns with some past exploration that has not found areas of strength for a based relationship with diabetes commonness.

Connection investigation was led to investigate the connection between age and periodontal seriousness, two ceaseless factors (Warsi et al., 2019). The investigation showed a feeble yet measurably critical positive connection among's age and periodontal seriousness ($r = 0.18$, $p < 0.05$). As people age, they often encounter a slight expansion in periodontal seriousness. This finding is steady with the thought that age is a gambling factor for different dental and periodontal circumstances.

One-way ANOVA was performed to think about the method for age across various degrees of periodontal seriousness. The ANOVA results were genuinely huge ($p < 0.05$), recommending that there are critical age contrasts between the serious gatherings (Akhtar et al., 2019). The discoveries of this study hold significant ramifications for clinical and dental experts. Perceiving the relationship between diabetes and periodontal seriousness underlines the requirement for cooperative consideration for diabetic patients, including the two endocrinologists and periodontists. Early identification and the board of periodontal issues in diabetic patients might add to better glycemic control and, by and large, well-being results (Stöhr et al., 2021). The relationship among's age and periodontal seriousness highlights the significance of normal dental check-ups and preventive measures as people age. Dental medical care suppliers ought to be mindful of the oral well-being needs of more seasoned grown-ups to expeditiously resolve possible periodontal issues.

Regardless of the important bits of knowledge acquired from this review, a few impediments should be recognized. First and foremost, the information utilized was cross-sectional, which restricts our capacity to surmise causality between the factors. Longitudinal investigations would give more hearty proof of worldly connections.

Future examination should investigate how diabetes impacts periodontal well-being. Understanding the organic pathways included may open new roads for designated mediations (Galvão & Roncalli, 2021). Longitudinal examinations following periodontal changes in diabetic patients over the long haul would give important bits of knowledge into sickness movement and the effect of diabetes the executives on periodontal well-being.

CONCLUSION

This exploration examined the connection between diabetes status and periodontal seriousness and the effect of old enough and orientation on these factors in Pakistan. The review uncovered a critical relationship between diabetes and various degrees of periodontal seriousness, highlighting the significance of incorporated medical care for diabetic patients' oral prosperity. Moreover, a positive connection among age and periodontal seriousness featured the requirement for proactive dental consideration as people age. These discoveries contribute significant experiences to the field of oral well-being and diabetes research in Pakistan, giving a premise to designated mediations and further developed interdisciplinary medical services approaches for better general well-being results.

Recommendation: Given the exploration results, it is suggested that general well-being mediations in Pakistan center around improving oral well-being mindfulness and advancing customary dental check-ups, particularly among diabetic people. Medical services arrangements ought to consolidate incorporated care models that stress joint effort among clinical and dental experts to address the interesting oral well-being needs of diabetic patients successfully. Besides, designated instructive missions can enable people to embrace better ways of life and deal with their diabetes to lessen the gamble of periodontal complexities, eventually working on the general well-being and prosperity of the populace

REFERENCES

1. Poudel P, Griffiths R, Wong VW, Arora A, Flack JR, Khoo CL, George A. Oral health knowledge, attitudes and care practices of people with diabetes: a systematic review. BMC public health. 2018 Dec;18(1):1-2.
2. Stöhr J, Barbaresko J, Neuenschwander M, Schlesinger S. Bidirectional association between periodontal disease and diabetes mellitus: a systematic review and meta-analysis of cohort studies. Scientific Reports. 2021 Jul 1;11(1):13686.
3. Akhtar S, Nasir JA, Abbas T, Sarwar A. Diabetes in Pakistan: A systematic review and meta-analysis. Pakistan journal of medical sciences. 2019 Jul;35(4):1173.

4. Srivastava MC, Srivastava R, Verma PK, Gautam A. Metabolic syndrome and periodontal disease: An overview for physicians. Journal of family medicine and primary care. 2019 Nov;8(11):3492.
5. Arias E, Xu JQ. United States life tables, 2017: national vital statistics reports. National Center for Health Statistics. 2019.
6. American Diabetes Association. Standards of medical care in diabetes—2022 abridged for primary care providers. Clinical Diabetes. 2022 Jan 1;40(1):10-38.
7. Shazam H, Shaikh F, Hussain Z, Majeed MM, Khan S, Khurshid Z. Evaluation of osteocalcin levels in saliva of periodontitis patients and their correlation with the disease severity: a cross-sectional study. European Journal of Dentistry. 2020 May 21;14(03):352-9.
8. Siddiqi A, Zafar S, Sharma A, Quaranta A. Diabetes mellitus and periodontal disease: The call for interprofessional education and interprofessional collaborative care-A systematic review of the literature. Journal of Interprofessional Care. 2022 Jan 2;36(1):93-101.
9. Akinyamoju CA, Taiwo JO, Uwadia E, Agbogidi JM, Ambeke A. Oral health knowledge and practice among traders in Ibadan. Annals of Ibadan Postgraduate Medicine. 2018;16(2):150-6.
10. González-Moles MÁ, Ramos-García P. State of evidence on oral health problems in diabetic patients: a critical review of the literature. Journal of Clinical Medicine. 2021 Nov 18;10(22):5383.
11. Nazir MA, AlGhamdi L, AlKadi M, AlBeajan N, AlRashoudi L, AlHussan M. The burden of diabetes, its oral complications and their prevention and management. Open access Macedonian journal of medical sciences. 2018 Aug 8;6(8):1545.
12. Galvão MH, Roncalli AG. Does the implementation of a national oral health policy reduce inequalities in oral health services utilization? The Brazilian experience. BMC Public Health. 2021 Dec;21(1):1-8.
13. Tada A, Miura H. The relationship between vitamin C and periodontal diseases: a systematic review. International journal of environmental research and public health. 2019 Jul;16(14):2472.
14. Rafiq M, Hasan R, Bano M. Prevalence of dental caries and periodontal disease among elderly patients attending private dental college karachi: a hospital based cross sectional study. Pakistan Oral & Dental Journal. 2018;38(4):500-2.
15. Hsu YC, Chang CC, Hsieh CC, Shih YH, Chang HC, Lin CL. Therapeutic Potential of Extracts from Macaranga tanarius (MTE) in Diabetic Nephropathy. Plants. 2023 Feb 2;12(3):656.
16. Ahmad R, Haque M. Oral health messiers: Diabetes mellitus relevance. Diabetes, Metabolic Syndrome and Obesity. 2021 Jul 1:3001-15.
17. Ehsan A, Riaz F, Raza A, Sahu EH, Rathore E, Abdullah U. Knowledge and Awareness of Oral Health in Type 2 Diabetes Mellitus Patients Visiting A THQ Hospital in Punjab, Pakistan. Pakistan Journal of Medical & Health Sciences. 2022 Jun 1;16(05):227-.
18. Anderson KE, McGinty EE, Presskreischer R, Barry CL. Reports of forgone medical care among US adults during the initial phase of the COVID-19 pandemic. JAMA network open. 2021 Jan 4;4(1):e2034882-.