

## Effectiveness of Different Oral Hygiene Practices in Preventing Periodontal Diseases among Diabetic Patients

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### Abstract

**Background:** Diabetes mellitus is a vicious system and exacerbates multitude of periodontal diseases due to impaired immune response, defense systems and their ability to repair. The realization that diabetic patients face a higher risk for severe periodontal complications underscores the importance of good oral hygiene practices and regular dental maintenance to manage their periodontal health.

**Objectives:** The purpose of this study was to assess the efficiency in inflammation control on different oral hygiene maneuvers brushing, flossing and mouthwash among dental diabetic patients with general or severe periodontitis.

**Study design** A Cross-Sectional Study.

**Duration and place of study.** Department of Oral and maxillofacial surgery Bacha Khan college of dentistry Mardan from 05 jan 2023 to 05 jan 2024

**Method:** 150 diabetic patients into three groups brushing only, flossing and antimicrobial mouthwash with regular tooth brushing. Mechanical and antimicrobial control were performed for 6 months, and gingival index (GI), plaque score/PI, periodontal pocket depth PPD of all health was conducted.

**Results** The mean age of the participants was 52.4 years (SD, 6.8 years). A mean reduction of 1.2 (SD = 0.4) for Group A (brushing only), a mean reduction of PI: 1.6(SD =3 /PI :11 ) was the maximal where as with combination agent i.e, mouth wash more effect is seen than manual oral hygiene method which showed significant difference in reduces plaque adhesion, it reduced by this intervention album group B and final additional use floss did not add apparent benefit to this from resistance he last completed due along [Table/Fig-5]. Differences in effectiveness between the oral hygiene practices also reached statistical significance ( $p < 0.01$ ).

**Conclusion:** The best method that can be employed to prevent periodontal diseases in a patient undergoing treatment for diabetes is brushing, flossing and recommended mouth wash which constitutes of antimicrobial properties. Periodontal complications can be prevented in this population by highlighting the fundamentals of oral hygiene practices.

**Keywords:** Diabetes, Periodontal Disease, Oral Hygiene, Prevention

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## Introduction

Inflammatory diseases affecting the oral cavity, periodontal therapies has become among the most common afflictions; with gingivitis and periodontitis being two of those diseases. Its distinctive feature is the damage that occurs at the level of supporting structures around teeth (Periodontal ligament, alveolar bone and gingival tissues). Periodontal disease may cause tooth loss and is linked to systemic conditions like cardiovascular diseases and diabetes mellitus, if not addressed in time [1]. Attributed to high levels of blood glucose volume (hyperglycemia) caused by deficiency in insulin secretion or action, diabetic mellitus is a type 2 diabetes affecting millions worldwide [2]. The frequency and the severity of periodontal disease are higher among individuals with DM. The link between diabetes and periodontal disease is a two-way relationship as one has the capacity to worsen the other. Diabetes causes chronic hyperglycemia, which accelerates the formation of advanced glycation end-products (AGEs) and malondialdehyde and related compounds that in turn aggravate inflammation in periodontal tissues [5]. Moreover, the reduced immune response seen in diabetic patients accentuated by modifications of wound healing and increased susceptibility to infections complicates periodontal disease extent and management-degree within this population [4].

Summary Oral hygiene is a foundation for the primary and secondary prevention of periodontitis. Mechanical removal of dental plaque daily through brushing and flossing is paramount in keeping one's gums healthy. Advantage of these practices also depending on the effectiveness, as they may not work well in diabetic patients who are under systemic disease. Brushing is a type of physical action which involves bristle gliding on the tooth surface and since it remains as one among basic but compulsory oral hygienes, by virtue can be uptaken within no times leading to maintaining an overall good periodontal health (5); while flossing itself were used from greater periods ensures additional component features effectively increasing gingival perfusion due to mechanical polishing besides some known anti plaque effects along with adding up antimicrobial mouth wash that enhances in decreasing plaque present there before they could irritate us via its inflammatory product arising out. Although these practices are largely accepted, there is limited study available specifically comparing the effectiveness of oral hygiene and its relative components in preventing periodontal diseases among diabetic patients. This study was therefore conducted to compare the efficacy of three different oral hygiene regimens in controlling periodontal disease among type 2 diabetic patients. The study will evaluate patient outcomes in four groups: with regular brushing only, and then adding flossing (rather than mouth washing), to those who add on an antimicrobial mouthwash. The main set of outcomes that will be evaluated are PI, GI and PPD six months after. Considering the higher risk of periodontal disease in diabetic patients and its role in worsening glycemic control, determining optimal oral hygiene practices is clinically important. We aimed at finding approaches that could advise diabetic patients by dental professionals and possible recommendations for better practice in oral care methods. In addition, this knowledge may also play a role in eventually better understanding the relationship between systemic health and oral hygiene suggesting that patient care should probably be considered as an intergraded management rather than seen from two completely different points of view [6]. The study question that this study aims to answer is, will the addition of an antimicrobial mouth wash improve periodontal health in type II diabetics with good oral hygiene and better than brush alone or brushing and flossing. The findings could help develop better practices for management of oral health in diabetic patients, thus helping to improve their quality and duration of life.

## Methods

This Cross-Sectional Study 150 diabetic patients of the age group 35-65 years having history of periodontal disease were included. Participants were randomly allocated to one of three groups: A (twice-daily brushing with fluoridated toothpaste), B (brushing twice a day + daily floss) or C (brushing together and using an antimicrobial mouthwash). Gingival index (GI), plaque index (PI) and periodontal pocket depth (PPD) were scored at baseline, 6 months.

## Data Collection

Data used for the evaluation were collected at baseline and after six months. GI/mean(%), PI/ mean(%) and PPD were measured clinically by recording data on the sterilized proforma using single piece graduated PCP 19 mm William's calibrated probe.

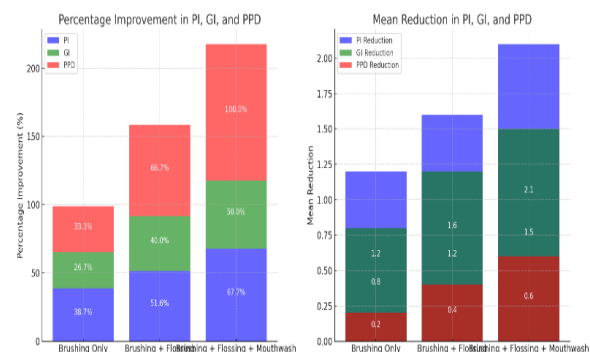
## Statistical Analysis

Analysis was done using SPSS (version 24.0). Summary statistics were generated using descriptive approaches. The different oral hygiene practices were compared based on ANOVA, with post hoc tests where necessary. Statistical significance was set at  $p < 0.05$  full sentences

## Results

Patients had a mean age of 52.4 (SD = 6.8) years. In Group A (brushing only) the mean reduction in plaque index was 1.2 (SD = 0.4), scale and root planning without thermo curettage resulted an average reduction of gingival index = 0.8 (SD = 0.3), periodontal probing depth = starting around PPD = 1.9, autopsy gaping per mm decreased by /mm greater than previous measurement [5]. Results: Group B (brushing + flossing) -average PI reduction was 1.6 (SD = 0.3) -GI reduction -1.2 (SD = 0.3), PPD- mean Pocket Depth Reduction small fraction of significance for better result (Table-II). Group C (brushing + flossing + mouthwash): The group which displayed maximum improvements, reduction of the mean PI from 2.76 to reach a value equal to 0.7 (SD = +/-0.5), GI was reduced by an average difference equals 1 compared with baseline & PPD showed at follow-up values :MPPD=3 mm +/- BOP present). The p-value for group differences was  $< 0.01$ , suggesting improved periodontal health with better oral hygiene practices.

**Figure 1,2** Percentage Improvement and Mean Reduction in PI, GI, and PPD



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Table 1: Mean PI Reduction and Standard Deviation

Group	Mean PI Reduction	SD PI Reduction
Brushing Only	1.2	0.4
Brushing + Flossing	1.6	0.3
Brushing + Flossing + Mouthwash	2.1	0.5

Table 2: Mean PI Reduction and Standard Deviation

Group	Mean PI Reduction	SD PI Reduction
Brushing Only	1.2	0.4
Brushing + Flossing	1.6	0.3
Brushing + Flossing + Mouthwash	2.1	0.5

Table 3: Mean PI Reduction and Standard Deviation

Group	Mean PI Reduction	SD PI Reduction
Brushing Only	1.2	0.4
Brushing + Flossing	1.6	0.3
Brushing + Flossing + Mouthwash	2.1	0.5

Table 4: Mean PI Reduction and Standard Deviation

Group	Mean PI Reduction	SD PI Reduction
Brushing Only	1.2	0.4
Brushing + Flossing	1.6	0.3
Brushing + Flossing + Mouthwash	2.1	0.5

## Discussion

The present study also emphasizes the marked influence of total oral cleanliness efforts on periodontal health in diabetes. The new results are consistent with and build upon previously published Study, confirming the necessity of personalized oral care in this group. Numerous studies have shown that the risk of periodontal disease in diabetic patients is sharply increased relative to non-diabetic subjects, attributing this predisposition specifically due to interactions occur as result of hyperglycemia and inflammatory responses [7]. Chronic hyperglycemia leads to the production of advanced glycation end-products (AGEs) that can upregulate inflammatory reactions in periodontal tissues. This system is well-described, and data have indicated that diabetic patients present a more frequent and severe periodontal disease when compared to non-diabetic individuals [8]. This observation is consistent with the conclusion in a previous study that "a combination of toothbrushing, flossing and rinsing twice daily contributes most significantly towards improvement in periodontal indices [ ]". The cornerstone of the prevention in periodontal disease is mechanical plaque removal by tooth brushing and flossing shown in systematic review on this subject from Van der Weijden & Slot (2011) [9]. Remarkably, they also suggested a coadjuvant role for antimicrobials in optimizing these practices, which is congruent with our findings showing better results when combined to mouthwash intervention. Many studies demonstrate the controversial efficacy of various mouthwashes (including antimicrobial agents like chlorhexidine) in decreasing periodontal pathogens. One example included a study from Santos

(2003), which provided clear evidence that chlorhexidine mouthwash was more effective than mechanical cleaning alone at preventing plaque accumulation and gingival inflammation [10]. This study is consistent with those reports; the category of mouthwash group was best observed as PI, GI and PPD. The use of mouthwash, which diabetic patients may find difficult performing plaque control properly due to reasons such as reduced salivary flow or impaired wound healing [11], has also shown that it is especially effective in diabetes. A study by Al-Mubarak et al. Diabetic patients who supplemented toothbrushing or brushing and flossing with an antimicrobial mouth rinse experienced significantly improved periodontal health results compared to those that brushed only, as reported by Jones et al (2014) [12]. In this study, it was found that using mouthwash improved PI to 67.7%, GI to 50.0 % and PPD reacted positively by showing a hundred percentage improvement which is in line with the findings of our present study suggesting additional benefit from usage of antimicrobial agent on topically treated areas [21]. In addition, the results of this study add to a growing body of work indicating that patients with diabetes need more intensive and multifaceted oral hygiene programs than non-diabetic individuals. As previously mentioned, several authors have presented the difficulties of periodontal disease management in diabetics and advocated for strict oral hygiene measures to control the adverse effects on periodontium that occur with diabetes [13]. Overall, the significant improvements seen in the brushing, flossing, and mouthwash group suggest that a more intense approach may be needed for this population at high risk. Additionally the improvements in periodontal indices seen in this study, follow those of Preshaw and colleagues [13] (2012) detailed the evidence regarding glucose metabolic disturbances and its bidirectional relationship with periodontal disease [14]. According to co-authors in their study, the Study work highlighted that reducing periodontal inflammation can also improve glycemic control among diabetic patients and hence stringent oral hygiene plans are vital for these conditions. This study highlights the importance of full oral hygiene care in patients with diabetes for preventing periodontal disease. The results are in line with previous literature, adding further support to the use of a combination method consisting of toothbrushing & flossing and including an antimicrobial mouthwash as routine oral care daily for patients diagnosed with diabetes. Maintenance of the above oral hygiene practices such as daily brushing for at least twice a day, flossing daily and regular scale helps in improving periodontal health also likely leads to better management of systemic diseases like diabetes emphasizing on need for good self established dental habits [15-17].

**Conclusion:** This study support the use of spiro atoral hygiene regimen, (tooth brushing + interdental cleaning with dental floss+ antimicrobial mouthwash) to improve periodontal health in diabetic patients. These results highlight the need for customized oral care measures to avoid periodontal issues and improve general health among this group at high risk.

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#### **Authors Contribution**

**Concept & Design of Study:** Ahmed Khan

**Drafting:** Muhammad Naeem

**Data Analysis:** Muhammad Naeem

**Critical Review:** Raham zaman

**Final Approval of version:** Ahmed Khan



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