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COMPARATIVE EFFECTIVENESS OF DENTAL FLOSS AND INTERDENTAL BRUSHES ON PLAQUE CONTROL IN PATIENTS WITH REDUCED PERIODONTIUM: A CLINICAL EVALUATION USING PLAQUE INDEX

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ABSTRACT

Background: To compare the effectiveness of dental floss and interdental brushes in reducing plaque index among patients with reduced periodontium.

Methods: A randomized clinical trial was conducted at the Department of Periodontology, Sardar Begum Dental College, Peshawar, from September 2024 to Oct 2024. Sixty-seven patients with reduced periodontium were randomly allocated into two groups: floss (n = 33) and interdental brush (n = 34). Baseline plaque index was recorded using the Silness and Löe Plaque Index. Participants were instructed to use their allocated interdental aid once daily in addition to tooth brushing for one month. Plaque index was reassessed at follow-up. Data were analyzed using paired and independent t-tests with $p < 0.05$ considered significant.

Results: Both groups demonstrated improvement, but the mean plaque index reduction was greater in the interdental brush group (0.75 ± 0.14) compared with the floss group (0.38 ± 0.12). The difference was statistically significant ($p = 0.001$). Moreover, a higher proportion of interdental brush users achieved a clinically meaningful reduction (73.5% vs. 33.3%; $p = 0.002$).

Conclusion: Interdental brushes were significantly more effective than dental floss in reducing plaque accumulation in patients with reduced periodontium. They should be recommended as the preferred interdental cleaning aid in such cases.

Keywords: interdental brushes, dental floss, plaque index, reduced periodontium, oral hygiene, periodontal care

INTRODUCTION

Periodontal disease remains one of the most prevalent oral health problems worldwide, leading to progressive loss of attachment and eventual tooth loss if left untreated. Even with appropriate mechanical tooth brushing, effective removal of plaque from interdental areas is often inadequate. This challenge becomes more pronounced in patients with reduced periodontium, where gingival

recession and loss of papillary architecture create open interdental spaces that are difficult to clean with a toothbrush alone (1-3).

To address this, interdental cleaning aids such as dental floss and interdental brushes are widely recommended. Dental floss has traditionally been considered the gold standard for interdental plaque removal, particularly in individuals with intact papillae and tight contacts. However, its effectiveness in patients with periodontal attachment loss has been questioned, partly due to difficulties in handling and reduced access in widened interdental spaces (4-6).

Interdental brushes, on the other hand, are specifically designed to clean larger embrasures. Several studies have reported that interdental brushes are more efficient in plaque removal and more acceptable to patients compared with floss, especially in periodontally compromised populations. Systematic reviews have further supported their superiority in reducing plaque and gingival inflammation. Despite this evidence, floss is still widely prescribed in clinical practice, creating the need for direct comparative studies in populations with reduced periodontium (7-9).

The present study was therefore conducted to evaluate and compare the effectiveness of dental floss and interdental brushes in controlling plaque levels among patients with reduced periodontium, using the Silness and Löe Plaque Index over a one-month follow-up period.

METHODOLOGY

This study was designed as a randomized comparative clinical trial. It was conducted in the Department of Periodontology, Sardar Begum Dental College, Peshawar. The study was carried out over a period of one months, from September 2024 to Oct 2024.

A total of 67 patients diagnosed with reduced periodontium were enrolled in the study. Patients were recruited from the outpatient periodontal clinic through convenience sampling and then randomly assigned to one of two intervention groups.

Inclusion criteria were

- Adults aged between 25 and 55 years
- Presence of at least 20 natural teeth
- Diagnosed with a healthy reduced periodontium, defined as:
- Clinical attachment loss of more than 2 mm **at** two or more interdental sites
- Probing pocket depth of 3 mm
- Full-mouth bleeding score <30%
- Full-mouth plaque score <30%
- Willingness to comply with oral hygiene instructions and attend follow-up visits

Exclusion criteria were:

- Patients with aggressive periodontitis or requiring immediate surgical periodontal therapy
- Those with systemic diseases known to influence periodontal health other than controlled diabetes
- Current orthodontic treatment or prosthodontic appliances interfering with interdental cleaning
- Use of antibiotics or anti-inflammatory drugs within the previous 3 months
- Pregnant or lactating women

Participants were randomly divided into two groups:

- Group A (n = 33): Assigned to use dental floss once daily in addition to their routine toothbrushing.
- Group B (n = 34): Assigned to use interdental brushes once daily in addition to their routine toothbrushing.

Randomization was carried out using a computer-generated random list, and allocation was concealed in sealed envelopes.

At the initial visit, demographic details (age, gender, smoking status, and relevant medical history) were recorded. A complete periodontal charting was performed. Plaque Index (Silness and Löe, 1964) was measured at two surfaces (mesial and distal) for all teeth except third molars. Baseline values were documented before any oral hygiene instructions were given.

Both groups received standardized toothbrushing instruction using the modified Bass technique. Participants were then trained in the use of their assigned interdental cleaning aid:

- Floss group received unwaxed dental floss and were instructed on correct technique with models and mirrors.
- Interdental brush group were provided with appropriately sized brushes (ISO size 0–2, depending on interdental space) and instructed on their use.

Participants were asked to perform their assigned method once daily in the evening after brushing, for a duration of one month. Compliance was reinforced with weekly reminders via phone.
After one month of intervention, patients were recalled, and plaque index was reassessed by the same examiner who was blinded to group allocation. Inter- and intra-examiner reliability for plaque scoring was established before the study began, and kappa values above 0.85 were maintained.
The primary outcome was the change in mean plaque index score between baseline and one month. A secondary outcome included the proportion of participants achieving a clinically meaningful reduction in plaque index (≥0.5 points) or reaching a final plaque index score below 1.0.
Data were analyzed using SPSS version 26.0. Continuous variables (age, plaque index scores) were expressed as mean ± standard deviation and compared using independent and paired t-tests. Categorical variables (gender, smoking status, responder rates) were expressed as frequencies and percentages, and comparisons were made using Chi-square or Fisher's exact test where appropriate. A p-value of less than 0.05 was considered statistically significant.

RESULTS

At baseline, both groups were similar in terms of demographic and clinical characteristics. The mean age was approximately 42 years in both groups, and the male-to-female ratio was almost identical. The distribution of smokers and diabetic patients was also comparable, and no statistically significant differences were noted. Importantly, the baseline plaque index scores were almost the same in the two groups (2.09 in floss users vs. 2.11 in interdental brush users; $p = 0.83$), confirming that both groups started from a similar level of oral hygiene.

Table 1. Baseline Characteristics of Participants (n = 67)

Variable	Floss (n=33)	Interdental Brush (n=34)	p-value
Age (years, Mean ± SD)	42.0 ± 7.1	41.6 ± 6.9	0.81
Gender (Male/Female)	19 / 14	20 / 14	0.94
Smokers (%)	7 (21.2%)	6 (17.6%)	0.72
Diabetes (%)	4 (12.1%)	3 (8.8%)	0.66
Baseline Plaque Index	2.09 ± 0.30	2.11 ± 0.29	0.83

Over the one-month period, both groups demonstrated improvement in plaque control. However, the magnitude of reduction differed substantially. The floss group showed a modest decline in plaque index (from 2.09 to 1.71), while the interdental brush group showed a much larger reduction (from 2.11 to 1.36). The mean reduction was nearly double in the interdental brush group (0.75) compared to the floss group (0.38). Statistical testing confirmed that this difference was highly significant ($p = 0.001$).

Table 2. Comparison of Plaque Index Reduction after One Month

Group	Baseline PI (Mean ± SD)	1-Month PI (Mean ± SD)	Mean Reduction	p-value
Floss (n=33)	2.09 ± 0.30	1.71 ± 0.26	0.38 ± 0.12	0.07
Interdental Brush (n=34)	2.11 ± 0.29	1.36 ± 0.22	0.75 ± 0.14	0.001*

* Significant at $p < 0.05$

To further evaluate the clinical relevance, the number of participants achieving meaningful plaque reduction was assessed. In the floss group, only one-third (33.3%) achieved a reduction of at least 0.5 points in plaque index, while nearly three-quarters (73.5%) of interdental brush users met this target. Similarly, just 18.2% of floss users achieved a final plaque index score below 1.0, compared with more than half (52.9%) in the interdental brush group. Both differences were statistically significant.

Table 3. Responders Based on Plaque Index Improvement

Outcome (Responders)	Floss (n=33)	Interdental Brush (n=34)	p-value
≥0.5 PI Reduction, n (%)	11 (33.3%)	25 (73.5%)	0.002*
Final PI < 1.0, n (%)	6 (18.2%)	18 (52.9%)	0.004*

* Significant at $p < 0.05$

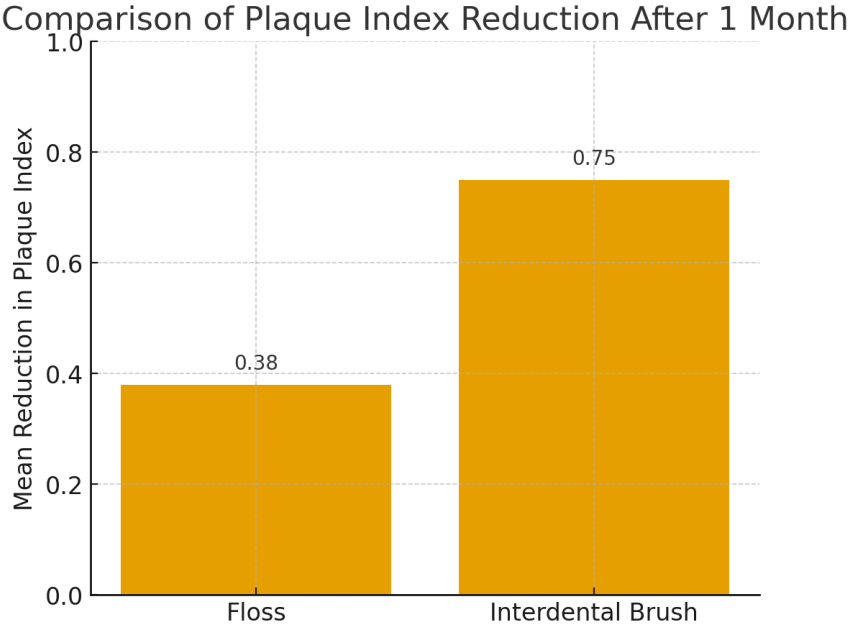

Figure 1: bar graph comparing the mean reduction in plaque index between the floss group and the interdental brush group. It clearly shows the superior reduction achieved with interdental brushes.

DISCUSSION

The present study compared the effectiveness of dental floss and interdental brushes on plaque control in patients with reduced periodontium. Both groups demonstrated improvement, but the reduction was significantly greater among patients using interdental brushes. This highlights the importance of selecting interdental cleaning aids according to the periodontal condition and anatomical changes in the interdental space (10, 11).

Our findings are consistent with previous clinical trials which have shown that interdental brushes are more effective than floss in reducing interdental plaque and gingival inflammation, especially in patients with attachment loss. Studies demonstrated that interdental brushes removed plaque more efficiently than floss in sites with widened interdental spaces (12-14). Similarly studies concluded that interdental brushes are superior to floss in reducing both plaque index and gingival bleeding, particularly in periodontally compromised patients (15, 16).

In the present study, nearly three-quarters of interdental brush users achieved a clinically meaningful reduction in plaque index (≥0.5), while only one-third of floss users reached this target. This outcome reflects the mechanical advantage of interdental brushes in cleaning open embrasures, which are common in patients with reduced periodontium. In contrast, floss may be more suited for patients with intact papillae and tight contacts, where an interdental brush cannot easily be inserted (17, 18).

Another important consideration is patient compliance. Interdental brushes are generally easier to handle and may be more acceptable to patients compared to floss, which requires more dexterity.

Previous work supports this observation, reporting that patients preferred interdental brushes due to their simplicity and comfort, leading to better long-term compliance. In our study, although adherence was not measured quantitatively, participants frequently reported that interdental brushes were easier to use (19, 20).

While the study strengthens the evidence supporting interdental brushes, some limitations should be acknowledged. The sample size was modest, and the follow-up period was only one month, which may not fully reflect long-term compliance or periodontal outcomes. Additionally, clinical attachment levels and gingival indices were not assessed alongside plaque reduction, which could provide a more comprehensive picture of periodontal health. Future research with larger populations, longer follow-up, and additional outcome measures would be valuable.

CONCLUSION

Within the limitations of this study, interdental brushes were found to be significantly more effective than dental floss in reducing plaque levels among patients with reduced periodontium. Their superiority was particularly evident in the proportion of patients achieving meaningful plaque reduction. Given their ease of use and higher effectiveness, interdental brushes should be recommended as the primary interdental cleaning aid for patients with periodontal attachment loss, while floss may remain suitable for individuals with intact papillae and tight interdental contacts.

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