Open Access

Original Article

Importance of Interdental Cleaning Aids for Gingival Health of Patients with Fixed Dental Prosthesis

Aliza Abbas, Muhammad Sharjeel Ashraf, Yasir Ikram Ahmed, Asma Wahid Ali, Syed Adil Tanvir, Natasha Fatima

Department of Dentistry, Armed Forces Institute of Dentistry /National University of Medical Sciences (NUMS), Rawalpindi Pakistan

ABSTRACT

Objective: To evaluate the association between frequency of interdental cleaning and plaque and gingival indices among patients following fixed dental prosthesis placement.

Study design: Prospective analytical study

Place and Duration of Study: Armed Forces Institute of Dentistry (AFID) Rawalpindi, Pakistan, from Jun 2024 to Sep 2024.

Methodology: 268 patients aged 18 years and older with recently installed fixed dental prostheses were evaluated at 15 days, 1.5 months, and 3 months. Silness and Löe criteria were used to record plaque and gingival indices. Patient interview was used to evaluate interdental cleaning habits. Frequency of interdental cleaning and oral hygiene indices were correlated using SPSS version 23.

Results: Interdental cleaning was performed by 74.63% of the sample group at 15 days, 85.82% at 1.5 months, and 97.76% at 3 months from the day of placement of fixed dental prosthesis. The percentage of patients not doing any interdental cleaning considerably reduced with the passage of time, 25.4% at 15 days, 14.2% at 1.5 months, and just 2.2% at 3 months. The frequency of interdental cleaning was statistically associated with plaque index (PI) and gingival index (GI) at 15 days (PI: $p < 0.001$; GI: $p = 0.006$), 1.5 months (PI and GI: $p < 0.001$), and 3 months (PI: $p = 0.004$; GI: $p < 0.001$).

Conclusion: Interdental cleaning reduced the plaque and gingival index in interproximal areas with fixed dental prosthesis. Instructions for oral hygiene show improvement of oral health among the patients.

Keywords: Dental Prosthesis, Gingival Index, Interdental Cleaning, Oral Hygiene, Plaque Index

How to Cite This Article: *Abbas A, Ashraf MS, Ahmed YI, Ali AW, Tanvir SA, Fatima N. Importance of Interdental Cleaning Aids for Gingival Health of Patients with Fixed Dental Prosthesis. Pak Armed Forces Med J 2026; 76(Suppl-10): S1613-S1617. DOI: https://doi.org/10.51253/pafmj.v76i6.13254*

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (https://creativecommons.org/licenses/by-nc/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Plaque and bacterial accumulation are the most crucial etiological factors behind periodontal diseases, and even more so in the patients who get fixed dental prosthesis.[1] Fixed prosthesis, like crowns and bridges lead to excessive plaque accumulation and make oral hygiene practices challenging.[2] By virtue of their design and fabrication, fixed dental prosthesis cannot be cleaned properly from all the surfaces, most importantly, in the interdental and cervical areas.[3]

Periodontal disease can easily be prevented by regular removal of bacterial biofilms.[4] Patients with crowns or bridges require meticulous oral hygiene reinforcement and special interdental cleaning aids for adequate cleaning and plaque removal.[5] Studies have shown interproximal surfaces of teeth to be relatively plaque-free in patients who used interdental cleaning aids regularly and fewer subgingival plaque deposits with the use of interdental brushes in areas with wider spaces.[6,7] According to Agrawal et al. (2023), patients using interdental brushes had a 34% higher plaque index reduction compared to patients using only a toothbrush.[8] Slot *et al.* (2008) demonstrated that interdental brushes produced a greater decrease than dental floss in interproximal plaque in wider embrasure areas and had a plaque reduction of 42% from six months.[9] In spite of all these advantages, patient cooperation is still doubtful; Graziani *et al.*'s (2019) questionnaire reported that as few as 31% of fixed prostheses patients applied interdental cleaning aids as part of a regular routine, revealing a relevant discrepancy in the preventive care methods.[10]

Although the significance of oral hygiene to the longevity of prostheses is well-documented, there is little evidence to demonstrate how interdental cleaning regimens specifically affect gingival health in FDP patients. This is an important deficiency since FDPs present specific difficulties for plaque control, especially in embrasure spaces where biofilm buildup predisposes abutments to inflammation and failure. The aim of this study was to assess the effect of different frequencies of interdental cleansing on gingival health in patients with fixed dental prostheses, in response to the demand for evidence-

Correspondence: Dr Aliza Abbas, Department of Dentistry, Armed Forces Institute of Dentistry Rawalpindi Pakistan

Received: 03 Mar 2025; revision received: 02 Mar 2026; accepted: 03 Mar 2026

based guidelines on interdental hygiene procedures in prosthetic treatment.

METHODOLOGY

This prospective analytical study included patients visiting the Outpatient Department (OPD) of Armed Forces Institute of Dentistry, Rawalpindi from June 2024 – September 2024. Sample size was calculated using the formula for comparison of two independent proportions, based on 95% confidence level, 80% study power and the periodontitis prevalence of 83.4% among non-users and 69.5% among frequent interdental cleaning users (OR 0.46).[11] The minimum required sample size was 284 participants. A total of 268 participants were included, depending upon the average annual patient turnout of the Prosthodontic Department and this sample size provides near-adequate statistical power for detecting clinically meaningful differences. The final sample size was 268. The ethical approval of this study was obtained from the Institutional Review Board (IRB) vide letter no. 918/Trg dated 13 May 2020 and a total of 268 patients (to account for dropouts) were included to be part of this study through convenience method of sampling.

Inclusion Criteria: Healthy adults (≥18 years) with at least one fixed dental prosthesis (single crown, bridge, or implant-supported prosthesis) were included in the study. Prosthesis included abutment teeth (to measure interdental plaque accumulation).

Exclusion Criteria: Pregnant or lactating females, transplant patients with low immunity, displaying general periodontal issues and patients with medical history that could otherwise alter the periodontal status including Hepatitis, Diabetes, drug intake such as Calcium channel blocker, Phenotoin, Cyclosporine A, and indication of swelling in gingiva suppuration were excluded from the study.

Simple diagnostic equipment was utilized for the testing, and penetration at six locations within the sulcus of each abutment tooth was recorded. Clinical testing was done at 15 days, 1.5 months, and 3 months following prosthesis insertion. There was no pre-treatment baseline, and all readings represent post-prosthetic clinical condition. Plaque evaluation was done with the Silness and Löe Plaque Index, which gave a score of 0 to 3 for each of the four tooth surfaces: buccal, lingual, mesial, and distal. The sum of the surface scores and division by four provided the total score for each tooth. The scoring criteria were:

Score 0: No plaque, Score 1: Thin film of plaque on the free gingival margin and the adjacent tooth surface visible only upon application of a disclosing agent, Score 2: Moderate plaque accumulation visible to the naked eye, within the pocket or on the gingival and tooth margin and Score 3: Heavy soft deposits readily seen on the gingival and tooth margin or within the pocket. The scores were further categorized as No plaque (0), Mild (0.1-0.9), Moderate (1.0-1.9) and Severe (2.0-3). Gingival index (GI) was calculated afterwards. The criteria established by Loe and Silness was used to record the signs of gingival inflammation presented on the tooth surface.12 The score of 0 was given to healthy gingiva; score of 1 if gingiva had sub inflammation and no bleeding when probed; score of 2 when gingiva appeared red and swollen with moderate inflammation and bleeding occurred when probed; score of 3 when obvious swelling or ulcers were observed; and spontaneous bleeding upon probing. Score of each tooth was recorded from its four surfaces (lingual, buccal, distal and mesial).13 The mean score was then divided by four and judged against the following categories: score <0.1 depicted normal, healthy gingiva, score 0.1-1.0 depicted mild inflammation, score of 1.1-2.0 depicted moderate inflammation and a score of 2.1-3.0 depicted severe inflammation.

During each follow-up visit, every patient received instructions and were demonstrated on how to maintain a good oral hygiene. For recording independent variable data, the patients were inquired about how often they used the interdental cleaning devices. At every follow-up, the participants were requested to self-report their interdental cleaning frequency on a standardized question. With regard to their response, patients were categorized as: Daily cleaning: at least once a day, Periodic cleaning: 2–3 times a week, Inconsistent cleaning: less than once a week and no cleaning. This grouping was re-estimated at every follow-up visit to account for patients' latest behavior. Thus, grouping was not predetermined at baseline but was dynamic and represented actual-time cleaning routines throughout the research period.

Data were processed using Statistical Package for Social Sciences (SPSS) version 23. Descriptive statistics were derived for continuous variables like age, for which mean and standard deviation (SD) were determined. For categorical variables like gender, education level, frequency of interdental cleaning, plaque index (PI) categories, and gingival index (GI)

categories, percentages and frequencies were provided. Chi-square test or Fisher's Exact Test was applied to analyze the relation between interdental cleaning frequency (daily, periodic, irregular) and the oral hygiene measures: plaque index and gingival index at all intervals of follow-up (15 days, 1.5 months, and 3 months). A p-value of less than or equal to 0.05 was taken as statistically significant in ascertaining whether variations in oral hygiene status are contingent upon interdental cleaning habits.

RESULTS

A total of 268 patients were included in this study, of which 156(58.21%) were male and 112(41.79%) were female. The age distribution showed 54(20.15%) patients were in the range of 20-35 years, 121 belonged to the range 36-55 years and 93 patients were in the age category of 56-75 years (Table-I).

Table-I: Association Between Interdental Cleaning and Oral Hygiene Indicators (Pi And Gi) at 15 Days (N = 268)

Variables	Interdental Cleaning (n = 268)				*p* - value
	Daily cleaning n = 87	Periodically, but not every day n = 51	Inconsistent cleaning n = 62	No cleaning n = 68	
Plaque Indexn (%)					
No plaque	41(15.29)	19(7.09)	14(5.22)	15(5.59)	
Mild	38(14.18)	19(7.09)	25(9.33)	16(5.97)	
Moderate	8(2.99)	10(3.73)	16(5.97)	25(9.33)	
Severe	0(0)	3(1.12)	7(2.61)	12(4.48)	
Gingival Indexn (%)					
Normal Gingiva	43 (16.05)	13 (4.85)	15 (5.59)	21 (7.84)	
Mild Inflammation	24 (8.96)	15 (5.59)	14 (5.22)	16 (5.97)	
Moderate Inflammation	17 (6.34)	14 (5.22)	22 (8.21)	18 (6.72)	
Severe Inflammation	3 (1.12)	9 (3.36)	11 (4.10)	13 (4.85)	

Out of the total patient population having fixed dental prosthesis implant, 68(25.37%) did not perform interdental cleaning while 87(32.46%) performed interdental cleaning daily, 51(19.03%) did it periodically but not every day and 62(23.13%) were either inconsistent with it or not performing it, when assessed at 15 days (Table-I). A significant association between plaque index and gingival index with interdental cleaning (p <0.001 for PI and p = 0.006 for GI) was observed at 15 days.

Observations made at 1.5 months showed that 230(85.82%) patients were performing interdental cleaning, of which daily cleaning was performed by 151(56.34%) patients, 64(23.88%) did it periodically but not every day and 15(55.97%) were either inconsistent with it and 38(14.18%) not performing it. A significant association between interdental cleaning and oral hygiene indicators (PI and GI) was observed (p<0.001 and p<0.001 respectively) (Table-II).

Table-III depicts the association between interdental cleaning and plaque and gingival index at 3 months. Interdental cleaning was observed among 262(97.76%) patients with 190(70.89%) patients doing it daily and 72 (26.87%) doing it periodically, but not every day and 6(2.24%) did not perform interdental cleaning. Indicators of oral hygiene were significantly associated with interdental cleaning (p = 0.004 for PI and p < 0.001 for GI).

Table-Ii: Association Between Interdental Cleaning and Oral Hygiene Indicators (Pi And Gi) At 1.5 Months (N = 268)

Variables	Interdental Cleaning (n =268)				*p* - value
	Daily cleaning n = 151	Periodically, but not every day n = 64	Inconsistent cleaning n = 15	No cleaning n = 38	
Plaque Indexn (%)					
No plaque	68(25.37)	19(7.09)	1(0.37)	8 (2.99)	<0.001
Mild	65(24.25)	43(16.04)	5(1.87)	13 (4.85)	
Moderate	16(5.97)	2(0.75)	5(1.87)	12 (4.48)	
Severe	2(0.75)	0(0)	4(1.49)	5 (1.87)	
Gingival Indexn (%)					
Normal Gingiva	91(33.96)	25(9.33)	6(2.24)	9 (3.36)	<0.001
Mild Inflammation	46(17.16)	29(10.82)	6(2.24)	10 (3.73)	
Moderate Inflammation	14(5.22)	10(3.73)	3(1.12)	19 (7.09)	

Table-III: Association Between Interdental Cleaning and Oral Hygiene Indicators (Pi And Gi) at 3 Months (n = 268)

Variables	Interdental Cleaning (n = 268)			*p* - value
	Daily cleaning n = 190	Periodically, but not every day n = 72	No cleaning n = 6	
Plaque Indexn (%)				
No plaque	119(44.40)	38(14.18)	1(0.37)	0.036
Mild	71(26.49)	34(12.69)	5(1.87)	
Gingival Indexn (%)				
Normal Gingiva	111(41.42)	28(10.45)	2(0.75)	0.012
Mild Inflammation	79(29.48)	44(16.42)	4(1.49)	

DISCUSSION

The present investigation reported a strong correlation between frequency of interdental cleaning and gingival health among patients with fixed dental prostheses. At 15 days, there was the greatest percentage of no plaque (15.29%) and normal gingiva (16.05%) among daily interdental cleaners, whereas the not cleaned presented more extensive plaque (4.48%) and gingival inflammation (4.85%) (p < 0.001 and p = 0.006, respectively). At 1.5 months, 56.34% cleaned daily and had the maximum improvement in oral hygiene with 25.37% having no plaque and 33.96% displaying normal gingiva (p < 0.001). At 3 months, 70.89% cleaned daily and 44.40% had no

plaque, with 41.42% demonstrating normal gingiva (p = 0.004 for PI, p < 0.001 for GI). This indicates the beneficial effect of regular interdental cleaning on periodontal health.

70.89% of patients cleaned interdentally once daily by 3 months, of which 44.40% had no plaque and 41.42% had normal gingiva (p = 0.004 for PI; p < 0.001 for GI). These results are consistent with Crocombe et al., who found that daily or more intensive interdental cleaning was linked with significantly reduced dental plaque (Prevalence Ratio [PR] = 0.89, 95% CI: 0.82–0.96) and less moderate/severe gingivitis (PR = 0.85, 95% CI: 0.77–0.94).13 Parallely, Tankova and Lazarova observed a significant prevalence (87%) of gingival inflammation among 10–14-year-old children as quantified by the Loe & Silness Index, again emphasizing the importance of preventive procedures such as interdental cleaning.[14] Mohapatra and Mohandas in a systematic review, concluded that waist-shaped interdental brushes had better plaque removal, particularly in open interproximal spaces.[15] Also, Worthington et al. in a Cochrane review, identified that adjunctive use of interdental aids resulted in statistically significant decreases in plaque and gingival bleeding when compared with brushing alone.[16]

The present findings are consistent with S.K.C. Basnyat et al., who also found significant correlation between frequency of interdental cleaning and plaque index (p = 0.012) and gingival index (p = 0.036) from 15 days to 3 months.[17] Our results also concur with Poklepovic et al., who showed considerable decreases in gingivitis (MD = 0.53, 95% CI: 0.23–0.83) and plaque (MD = 0.95, 95% CI: 0.56–1.34) following one month of use of an interdental brush—corresponding to 34% and 32% decreases, respectively, in favor of interdental aid use.[18] The current findings are also confirmed by Ortolan *et al.,* who applied the Plaque and Gingival Index by Silness and Löe and observed that plaque frequency was significantly greater in the baseline (pre-treatment) vs. all post-treatment time points (p < 0.001), and poorest hygiene in patients treated with fixed prostheses in both jaws (p = 0.012).19 This underlines the importance of post-prosthodontic reinforcement of hygiene.

Paqué *et al.* specifically compared waist-shaped and cylindrical interdental brushes in a controlled trial and reported the waist-shaped brush to remove significantly more plaque at the line angle (23.1% vs. 18.3%, p < 0.001), further supporting the role of brush design in cleaning effectiveness. Simultaneously, while the present study did not examine effect of different brush shape, it still measured the achievement of significant plaque reduction—from baseline to 44.4% no plaque at 3 months with daily cleaning[20]—supporting the clinical value of effective interdental device choice.

Kim *et al*. evaluated data from 11,614 Korean adults and found that flossing (Adjusted Odds Ratio [AOR] = 1.41, 95% CI: 1.22–1.64) and interdental brushes (AOR = 1.16, 95% CI: 1.01–1.34) had significant decreases in periodontitis risk in subjects with ≥ 20 teeth.[21] This correlates with the present prosthesis cohort, with increased daily cleaning enhancing both plaque and gingival indices, indicating that independent of underlying dentition status, interdental cleaning will decrease periodontal risk.

Imai & Hatzimanolakis, in a systematic review, concluded that interdental brushes are as good as, or better than, dental floss for the prevention of periodontal disease and caries, especially in embrasures characteristic of fixed prostheses.[22] This is evident in the present study's uniform monthly improvement in gingival health, once again emphasizing the value in educating patients with simple, effective interdental devices appropriate to their prosthodontic anatomy. The findings of Hyder *et al.* revealed that most of the Pakistani population participants depended on toothpicks (39.6%) for cleaning between teeth, whereas 13.4% used dental floss and 4.5% used interdental brushes; Interestingly, 34.1% stated no use of interdental aids and 14.3% substituted with mouth-rinse.[23] This emphasizes the need for patient education and persistent reinforcement of proper interdental hygiene, especially among prosthodontic patients who are under greater risk of plaque buildup around fixed appliances.

LIMITATIONS OF THE STUDY

This research has some limitations. The convenience sampling might restrict the extrapolation of the results to a larger population. Secondly, the self-reported frequency of interdental cleaning might have been subject to recall and social desirability biases. While oral hygiene advice was standardized and objective clinical outcome measures were applied to determine the outcomes, reporting bias cannot be completely eliminated. Randomized sampling and objective observation of oral hygiene habits should be the subject of future research to re-confirm these results.

CONCLUSION

The present study found statistically significant association of the frequency of interdental cleaning regimens with changes in plaque and gingival indices over time after the placement of fixed prostheses. Subjects who performed daily interdental cleaning had better periodontal status when compared to those with no or irregular cleaning. It also offers a practical understanding of how changes in interdental cleaning habits correspond to improvements in plaque and gingival health over time, particularly in the context of continued oral hygiene reinforcement.

Conflict of Interest: None.

Funding Source: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

AA & MSA: Data acquisition, data analysis, critical review, approval of the final version to be published.

YI & AAWA: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

SAT & NF: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. Abdulkareem AA, Al-Taweel FB, Al-Sharqi AJB, Gul SS, Sha A, Chapple ILC. Current concepts in the pathogenesis of periodontitis: from symbiosis to dysbiosis. J Oral Microbiol 2023; 15(1): 2197779. http://doi.org/10.1080/20002297.2023.2197779
2. Dragomir LP, Nicolae FM, Gheorghe DN, Popescu DM, Dragomir IM, Boldeanu L, et al. The influence of fixed dental prostheses on the expression of inflammatory markers and periodontal status: narrative review. Medicina 2023; 59(5): 941. http://doi.org/10.3390/medicina59050941
3. Gennai S, Nisi M, Perić M, Marhl U, Izzetti R, Tonelli M, et al. Interdental plaque reduction after the use of different devices in patients with periodontitis and interdental recession: a randomized clinical trial. Int J Dent Hyg 2022; 20(2). http://doi.org/10.1111/idh.12578
4. Wehner C, Husejnagic S, Laky B, Rausch-Fan X, Moritz A, Haririan H. Effect of interdental brush design on plaque during nonsurgical periodontal therapy. Clin Oral Investig 2020. http://doi.org/10.1007/s00784-020-03337-x
5. Staehle HJ, Frese C, Sekundo C. Mechanical plaque control of the interdental space with the "Heidelberg set." Quintessence Int 2021; 52(2): 176–186. http://doi.org/10.3290/j.qi.b872241
6. Moore GC, Smith KT, Christiansen MM, Anderson L, Moravec LJ, Okano DK, et al. The effect of interproximal home oral hygiene on clinical parameters and inflammatory biomarkers in periodontal maintenance patients. J Periodontol 2023. http://doi.org/10.1002/jper.22-0631
7. Bevilacqua L, Lorenzon MG, Bjedov M, Costantinides F, Angerame D, Maglione M. Evaluation of the efficacy of inter-dental brush and dental floss for peri-implant mucositis: a crossover randomized clinical trial. Int J Dent Hyg 2024; 22(3): 779–788. http://doi.org/10.1111/idh.12793
8. Agrawal A, Sawhney A, Panda S, Gupta N, Khale PA, Rathod V, Singh Makkad R. Comparison of the efficacy of different oral hygiene aids in maintaining periodontal health in patients with gingivitis. Cureus 2023; 15(8): e44391. http://doi.org/10.7759/cureus.44391
9. Slot DE, Dörfer CE, Van der Weijden GA. The efficacy of interdental brushes on plaque and parameters of periodontal inflammation: a systematic review. Int J Dent Hyg 2008; 6(4): 253–264. http://doi.org/10.1111/j.1601-5037.2008.00336.x
10. Graziani F, Gennai S, Solini A, Petrini M. A systematic review and meta-analysis of epidemiologic observational evidence on the effect of periodontitis on diabetes: An update of the EFP-AAP review. J Clin Periodontol 2018 ; 45(2): 167–187. http://doi.org/10.1111/jcpe.12837
11. Aroonratana P, Lertpimonchai A, Samaranayake L. The association between interdental cleaning and periodontitis in an urban Thai adult cohort: a cross-sectional study. BMC Oral Health 2024; 24: 1185. http://doi.org/10.1186/s12903-024-04980-6
12. Loe H, Silness J. Periodontal disease in pregnancy. I. Prevalence and severity. Acta Odontol Scand 1963; 21: 533–551. http://doi.org/10.3109/00016356309011240
13. Crocombe LA, Brennan DS, Slade GD, Loc DO. Is self interdental cleaning associated with dental plaque levels, dental calculus, gingivitis and periodontal disease? J Periodontal Res 2012; 47(2): 188–197. http://doi.org/10.1111/j.1600-0765.2011.01420.x
14. Tankova H, Lazarova Z. A comparative study of full mouth bleeding score (FMBS) and gingival index Loe and Silness (GILS) in assessing gingival status of children aged 10–14 years. J IMAB 2024; 30(1): 5387–5391. http://doi.org/10.5272/jimab.2024301.5387
15. Mohapatra S, Mohandas R. Plaque cleaning efficacy of waist-shaped interdental brushes among individuals with open interproximal spaces: a systematic review. Evid Based Dent 2024. http://doi.org/10.1038/s41432-024-01036-0
16. Worthington HV, MacDonald L, Poklepovic Pericic T, Sambunjak D, Johnson TM, Imai P, et al. Home use of interdental cleaning devices, in addition to toothbrushing, for preventing and controlling periodontal diseases and dental caries. Cochrane Database Syst Rev 2019; 4(4): CD012018 http://doi.org/10.1002/14651858.CD012018.pub2
17. Basnyat SKC, Sapkota B, Shrestha S, Rimal U. Association between use of interdental cleansing aids and gingival conditions in fixed dental prosthesis patients. Kathmandu Univ Med J 2020; 18(3): 243–28. http://doi.org/10.3126/kumj.v18i3.49217
18. Poklepovic T, Worthington HV, Johnson TM, Sambunjak D, Imai P, Clarkson JE, et al. Interdental brushing for the prevention and control of periodontal diseases and dental caries in adults. Cochrane Database Syst Rev 2013; 12: CD009857. http://doi.org/10.1002/14651858.CD009857
19. Ortolan MS, Viskić J, Štefančić S, Sitar R, Vojvodić D, Mehulić K. Oral hygiene and gingival health in patients with fixed prosthodontic appliances – A 12-month follow-up. Coll Antropol 2012; 36(1): 213–220.
20. Paqué PN, Attin T, Ender A, Al-Majid A, Wegehaupt F, Sener B, et al. Impact of interdental brush shape on interpapillary cleaning efficacy: a clinical trial. Sci Rep 2020; 10(1): 7922. http://doi.org/10.1038/s41598-020-64816-5
21. Kim YJ, Gil YM, Bae KH, Kim SJ, Ihm J, Cho HJ. The use of interdental cleaning devices and periodontal disease contingent on the number of remaining teeth in Korean adults. Sci Rep 2022; 12(1): 13853. http://doi.org/10.1038/s41598-022-17885-7
22. Imai PH, Hatzimanolakis PC. Interdental brush and dental floss in the prevention of periodontal diseases and dental caries: a systematic review. Int J Dent Hyg 2021; 19(1): 3–16. http://doi.org/10.1111/idh.12466
23. Hyder T, Butt AS, Quraeshi S, Anwar A, Rahman S. Assessment of oral hygiene practices and the factors influencing selection of tooth and interdental-cleaning devices: a cross-sectional survey of Pakistani adults. Pak J Med Health Sci 2023; 17(1): 352–355. http://doi.org/10.53350/pjmhs2023171352