

# Comparative evaluation of efficacy and patient-reported outcome measures of oral hygiene instruction methods for calibrated interdental brush

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## Abstract

**Objectives:** To compare the efficacy and patient-reported outcome measures of oral hygiene instruction methods for calibrated interdental brush.

**Materials and Methods:** A total of 60 participants, with 30 each in control and test group, participated in the study. Clinical examination included gingival index, full mouth bleeding scores and approximal plaque index. Supragingival scaling was performed. Interdental access probe was used to assess the size of interdental brush and corresponding interdental brush were given to the participants. For the control group, oral hygiene instructions were given through demonstration with model and video. For the test group, oral hygiene instructions were given through 'Touch-to-Teach' method. At 4-week follow-up, oral hygiene instructions were repeated to respective groups. After 3 months, clinical examination was done and exit survey on patient-reported outcome measures was administered. Statistical analysis was done.

**Results:** Intergroup comparison of gingival index, full mouth bleeding index and approximal plaque index showed statistically significant difference between test and control group. 'Touch-to-Teach' method of oral hygiene instruction was found to be 'Good'. Acceptance of interdental brush was regarded to be 'Good'.

**Conclusion:** Within limitations of the study, Touch-to-Teach method of oral hygiene instruction method was found to be effective and more acceptable and participants used the interdental brush regularly.

## KEYWORDS

gingivitis, interdental brush, oral hygiene, Touch-to-Teach method

## 1 | INTRODUCTION

Mechanical plaque control is the cornerstone in management of dental biofilm.<sup>1</sup> Tooth brushing is the most widely known self-performed mechanical plaque biofilm removal/control method at home. While toothbrushes are effective in removing dental plaque from buccal, lingual and occlusal aspects of teeth, by virtue of their design, they have limited access to interdental areas and are inefficient in cleaning

interproximal surfaces of teeth.<sup>2</sup> Plaque control in interdental areas is particularly important because these areas are more susceptible for periodontal diseases with greater severity.<sup>3</sup> European Federation of Periodontology recommends that—'Daily cleaning between your teeth using special "interdental" brushes is essential for treating and preventing gum disease'.<sup>4</sup>

As per a recent network meta-analysis on interproximal oral hygiene methods in the reduction in clinical indices of inflammation,

interdental brush and water jets are ranked to be high for reducing gingival bleeding, while toothpicks and floss ranked last.<sup>5</sup> The Korea National Health and Nutrition Examination Survey reported that the use of an interdental brush could alleviate periodontal health inequality.<sup>6</sup> With advent of calibrated interdental brushes and greater range of interdental brush sizes, they have proven to be safe and effective even with individuals with interdental papilla that fills the interdental space.<sup>7-9</sup>

There is substantial evidence that mechanical and chemical plaque control methods can prevent periodontal diseases and also depend on behaviours such as thoroughly performed tooth brushing and interdental mechanical cleansing at regular intervals.<sup>10-12</sup> So far, oral health education has been largely dependent on method like demonstration on models, projected aids like video clips, non-projected aids like posters, photographs, models and other audio-visual aids.<sup>13,14</sup>

Considering the pitfalls of conventional methods of oral health educational aids and also due to the increasing prevalence of dental diseases like dental caries and periodontal diseases, a patient-centric, personalized approach called 'Individually Trained Oral Prophylaxis' (iTOP) which uses a 'Touch-to-Teach' concept was introduced by MUDr. Jiří Sedelmayer.<sup>15</sup> It is a systematic way to learn optimal oral health management through hands-on training (Touch-to-Teach) with the use of selected tools and techniques. iTOP is an effective and non-traumatic way of learning good oral care. The principle is based on practicing the knowledge and skills on a daily basis for dental professionals themselves and eventually for patients.<sup>15,16</sup>

A recent systematic review reported that there is insufficient high-quality evidence to recommend any specific one-to-one oral hygiene instruction method as being effective in improving oral health.<sup>17</sup> Also, a network meta-analysis on interproximal oral hygiene aids reported that the patient-reported outcomes of the interdental aids are not clear because most of the studies have investigated disease-oriented outcomes of gingival health, providing only limited information what matters to patients.<sup>5</sup> Hence, this study aims to evaluate the efficacy of oral hygiene instruction

methods and patient-reported outcome measures for calibrated interdental brush.

## 2 | MATERIALS AND METHODS

The present preliminary study was conducted between December 2019 and February 2020. The study protocol was reviewed and approved by the Institute Ethical Committee (Krishnadevaraya College of Dental Sciences & Hospital Ethical Committee India; KCDS/Ethical Comm/006/2019-20). Written informed consent was obtained from all participants after thorough explanation of the nature of risks and benefits of the clinical investigation and associated procedures. While conducting the study, ethical principles outlined in the Declaration of Helsinki for research involving human subjects as revised in 2013 were followed.

A minimum sample size of 52 was estimated based on our pilot study to obtain power of 80% and at 95% confidence interval (Standard Deviation 0.7) using online software (OpenEpi) Open Source Epidemiologic Statistics for Public Health, Version 3.01. Considering drop out total of 66 (1:1 allocation ratio, 33—control, 33—test) participants belonging to 20–50 years of age group. Randomization was done using computer-generated codes. An independent individual performed the randomization and allocation of participants into the test and control groups. Individuals who presented with Gingivitis (As per 2017 World Workshop Classification)<sup>18</sup> were recruited for the study. The inclusion criteria were as follows:  $\geq 18$  years of age and  $< 50$  years and  $\geq 20$  teeth. Exclusion criteria were individuals who use interdental aids already, periodontal pocket depth  $> 4$  mm, smoking, pregnancy and lactation.

All the participants who underwent initial screening for inclusion criteria were evaluated for gingival index (Löe and Silness, 1963), full mouth bleeding score and approximal plaque index (Lange, 1986) and underwent supragingival scaling. A colour-coded interdental access probe (IAP Curaprox™, Curaden International AG, Kriens, Switzerland) was used to evaluate the correct size of interdental brush (Curaprox CPS Prime™; Curaden AG) for all the participants. Size determination



FIGURE 1 Model and video used for demonstration of use of interdental brush

for interdental brushes using interdental access probe was performed for all the participants. The pressure applied by interdental access probe in the interdental area should be firm and continuous until reaching maximum compression with minimal discomfort to the patient.<sup>19,20</sup> Interdental brushes were chosen based on the size determination performed using interdental access probe.<sup>21</sup> Before the commencement of the study, intra-examiner calibration was achieved by examination of 30 sites twice, 24 h apart. Calibration was accepted if measurements at baseline and 24 h were similar. Intra-examiner reliability was noted to be acceptable (Cohen's kappa value = 0.8). All the clinical examinations were done by a single examiner who was blinded to allocation of participants groups. For the control group, oral hygiene instructions for the use of interdental brush were given using demonstration of video<sup>22</sup> and on model (Figure 1). For the test group, oral hygiene instructions for use of interdental brush were given using 'Touch-to-Teach' (T2T) method<sup>15</sup> which involves hands-on teaching of correct use of oral hygiene aids by a trained instructor. Participants were made to sit comfortably on dental chair and were given a mirror to watch while the instructor performed the correct use of interdental brush in their mouth. The interdental brush is gently inserted above the tip of interdental papilla at an angulation that does not traumatize the papilla. The interdental brush is inserted in parallel manner without applying much pressure. The brush is gently passed through and taken out carefully.<sup>9</sup> Further, participant was asked to perform the use of interdental brush on their own in the presence of instructor. With this, instructor verified and corrected the participants' interdental cleaning using interdental brush (Figure 2). Participants were advised to perform modified Bass method for tooth brushing twice a day using ultra-soft toothbrush and perform interdental cleaning using assigned interdental brush once a day. Participants were advised not to thrust the interdental brush repeatedly and use it only as per given instructions. All the participants were advised to refrain from any other professional oral hygiene services, over-the-counter oral hygiene products, mouthwashes and other oral hygiene aids.

To check the compliance, participants were asked to maintain a diary. After 4 weeks, patients were called for a follow-up and asked for their diary. For the control group, oral hygiene instructions using model and video demonstration were repeated. For the test group, participants were asked to perform interdental cleaning using interdental brush in the presence of instructor and necessary reinforcement of technique was done. Further, all the participants were recalled after 3 months for the final follow-up. Clinical examination was performed, and indices were recorded. An exit survey consisting of questions on acceptability of interdental brush, method of oral hygiene instruction, discomfort while using interdental brush, perceived efficacy which were to be rated on 3-point Likert scale and also question on regular usage, and reasons for not using interdental brush was administered. After the completion of study, participants from control group were given oral hygiene instructions as per 'Touch-to-Teach' method, so as to motivate them to regularly perform interdental cleaning.

Participants were informed to make note of any soft tissue trauma as indicated by clinically visible gingival cuts, redness,

abraded areas, or damaged interdental papilla and clinical examination to look for any adverse events were performed by the instructor both at 4-week recall and at the end of 3 months.

## 2.1 | Statistical analysis

Statistical analysis was performed using IBM SPSS<sup>®</sup> version 22. Descriptive statistics were calculated. A test of normality was performed using Shapiro-Wilk test. Based on test of normality, parametric tests were considered for comparison of clinical parameters. Inter-group comparison between baseline and 3-month follow-up were performed using independent t test. For the comparison between patient-reported outcome measures (PROMs), Fisher's exact test was used.

## 3 | RESULTS

The study comprised of 66 participants with 33 in control and 33 in test group. The participants belonged to 20–50 years age group. At the time of 4-week follow-up, there was a drop out of 2 participants

### Measuring interdental space using color coded Interdental access probe



### Corresponding sized interdental brush is given



### Touch to Teach Method – Correct use of interdental brush shown directly in mouth

**FIGURE 2** Illustration of measurement of interdental space using colour-coded interdental access probe and Touch-to-Teach method for using interdental brush

each in test and control group, and further at 3-month follow-up, 1 participant each from test and control group dropped out of the study. For final analysis, total sample was 60 individuals with 30 each in test and control groups. Study timeline is shown in Figure 3.

At baseline, there was no statistically significant difference between measured clinical parameters among the test and control group. It was noted that there was statistically significant difference between test and control group for measured groups at 3-month follow-up. Descriptive statistics and results of comparison of indices between baseline and 3-month follow-up are given in Table 1. Results of patient-reported outcome measures are as presented in Table 2. There was statistically significant difference between the groups on acceptability, regularity in use and method of oral hygiene instruction for interdental brush.

With regard to compliance, based on participants diary, it was noted that few participants from control group were not very regular in performing interdental cleaning at 4-week follow-up. After the 3-month follow-up, 100% of the participants from test group were found to be regular in using interdental brush, while only 36.7% from control group were noted to be regular. In the exit survey, it was noted that the most common reasons for not being regular in using interdental brush were lack of motivation and not knowing how to use interdental brush properly. It was noted that there were no adverse events of soft tissue trauma during the entire study duration.

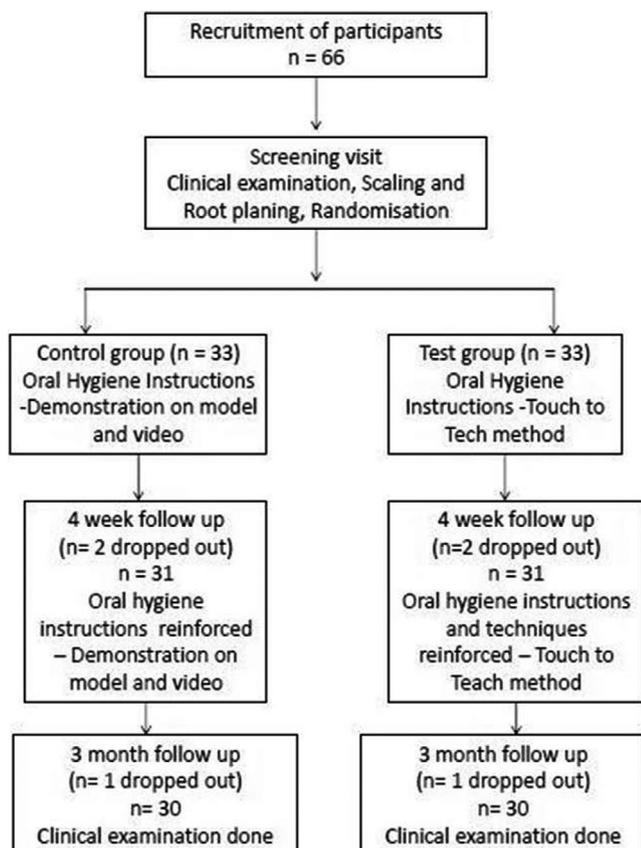


FIGURE 3 Timeline of the study

## 4 | DISCUSSION

The present study evaluated the efficacy of 'Touch-to-Teach' method of oral hygiene instruction in comparison with demonstration on model/ via video method, along with patient-reported outcome measures of interdental brush. It was noted that among the test group, there was statistically significant reduction in gingival index (GI), full mouth bleeding score (FMBS) and approximal plaque index (API) after 3 months. Among the control group, assessed indice values were reduced among very few participants, and there was no statistically significant difference between baseline and 3-month follow-up. The use of calibrated interdental brush for interdental cleaning has shown promising results. Previous study by Bourgeois et al. has reported that daily use of calibrated interdental brushes reduces interdental bleeding.<sup>9</sup> Accessibility of calibrated interdental brushes has also been studied. It was reported that the overall accessibility prevalence of any interdental brush was 92.3%.<sup>19</sup> Our study is in accordance with the above-mentioned studies. In the present study, calibrated interdental brushes were used, which has shown positive results in terms of bleeding reduction, acceptability and comfort to use. A recent study provided perspective on effect of interdental brushes on oral micro flora. It is reported that daily use of calibrated interdental brushes can reduce periodontal pathogens, re-establish symbiotic microbiota and decrease interdental inflammation in interdental sites of healthy young adults.<sup>23</sup> A study has quantitatively detected the presence of 19 major periodontopathogens in interdental biofilm of healthy young adults.<sup>24</sup> It was emphasized that there is a need to develop new methods for disrupting interdental biofilm in daily oral hygiene. Studies have also shown that interdental sites harbour carious pathogens in adolescents and young adults.<sup>25,26</sup> The results of these studies substantiate and justify the use of calibrated interdental brush in the present study. With increasing evidence on connection between systemic health and periodontal diseases,<sup>27,28</sup> additional home care measures of prevention by incorporation of interdental cleaning in patients' routine may prove beneficial. There are several scientific papers on dental health education which shows weak evidence in improvement in knowledge leading to improved oral health behaviour.<sup>29</sup> High standards of oral hygiene can be achieved by patient education, need related oral hygiene instruction and by improving individuals skill.<sup>30</sup>

A previous study on effectiveness of oral hygiene routines depending upon method of patient education reported that 'Touch-to-Teach' method based on principles of individually trained oral prophylaxis improved the efficacy of motivational efforts and clinical parameters like gingival bleeding and dental plaque reduction.<sup>16</sup> The results of present study are in agreement with the above-mentioned study with regard to improvement in full mouth bleeding scores in test group who received 'Touch-to-Teach' method of oral hygiene instruction. Our study differed in terms of parameters used to assess, statistical measures and the method of oral hygiene instructions given to control group. As reported in a previous study, motivation to use interdental brush is related to the perception of the effectiveness of the brushes and the perception of bleeding reduction.<sup>20</sup>

**TABLE 1** Descriptive statistics and Intergroup comparison among Test and Control Groups

	Group	N	Mean	Std. Deviation	p-value
<b>Baseline</b>					
FMBS (%)	OHI—Model, Video	30	53.167	14.29	0.926
	OHI—Touch-to-Teach	30	52.833	13.37	
API (%)	OHI—Model, Video	30	54.833	13.22	0.558
	OHI—Touch-to-Teach	30	52.833	13.0439	
GI	OHI—Model, Video	30	2.063	.2859	0.926
	OHI—Touch-to-Teach	30	2.057	.2674	
<b>3 months</b>					
FMBS (%)	OHI—Model, Video	30	47.333	12.4384	0.001*
	OHI—Touch-to-Teach	30	15.113	10.0540	
API (%)	OHI—Model, Video	30	51.200	12.1780	0.001*
	OHI—Touch-to-Teach	30	14.900	10.5188	
GI	OHI—Model, Video	30	1.9467	.24877	0.001*
	OHI—Touch-to-Teach	30	1.2500	.31496	

Abbreviations: API, Approximal plaque Index; FMBS, Full mouth bleeding score; GI, Gingival index; OHI, Oral hygiene instructions.

\* $p < 0.05$  is considered as statistically significant.

**TABLE 2** Patient-reported outcome measures among Control and Test groups

PROMs		OHI—Model, Video	OHI—Touch to Teach
Acceptability of IDB	Good	80% (n = 24)	100% (n = 30)
	Fair	16.7% (n = 5)	—
	Poor	3.3% (n = 1)	—
	p-value	0.024*	
Discomfort while using IDB	High	—	—
	Moderate	16.7% (n = 5)	16.7% (n = 5)
	No discomfort	83.3% (n = 25)	83.3% (n = 25)
	p-value	0.99	
Perceived efficacy	Good	86.7% (n = 26)	100% (n = 30)
	Fair	13.3% (n = 4)	—
	Poor	—	—
	p-value	0.99	
Have you been using IDB regularly	Yes	36.7% (n = 11)	100% (n = 30)
	No	63.3% (n = 19)	—
	p-value	0.001*	
Method of OHI	Good	—	100% (n = 30)
	Fair	40% (n = 12)	—
	Poor	60% (n = 18)	—
	p-value	0.001*	

Abbreviations: IDB, Interdental brush; OHI, Oral hygiene instruction; PROMs, Patient-reported outcome measures.

\* $p < 0.05$  is considered as statistically significant.

In the present study along with effectiveness of interdental brush and reduction in bleeding, patient education method also showed to be an additional factor in motivation of patients to use interdental brushes regularly.

Nardi et al. conducted a study on 'Tailored Brushing Method' which was based on the concordance between professionals and patients and based on the proper choice of best tools for oral hygiene regardless of the technique used. It was noted that there

was significant improvement in plaque index and gingival index.<sup>31</sup> Although their attempt of personalized approach was similar to present study, their study has not concentrated on method of oral hygiene instructions and the techniques used. In the present study, proper technique to use interdental brush was taught using 'Touch-to-Teach' method, and calibrated interdental brushes were used, thereby making it a safer and effective approach towards personalized care.

Adherence to oral hygiene is an important aspect of periodontal therapy. Traditional patient educational interventions have been shown to be of little value in achieving long term behaviour change.<sup>32</sup> In the present study, the concept of individually trained oral prophylaxis was employed. 'Touch-to-Teach' method forms the basis of individually trained oral prophylaxis. It deals with skills, knowledge and proper use of effective tools and techniques to practice a healthy oral hygiene regimen.<sup>15</sup> In the present study, it was noted that among the test group, that is the individuals who received oral hygiene instructions through 'Touch-to-Teach' method showed significantly higher regularity in interdental cleaning. This can be attributed to the personalized approach that deals with individualized training using correct technique and right tools. Among the individuals who reported irregular use of interdental brush, majority were from control group and the common reasons cited were lack of motivation and not knowing the right method of usage. Among the test group, majority of the participants rated 'Good' for Touch-to-Teach method of oral hygiene instruction, while in control group, majority of the participants rated 'Poor' for demonstration on model or video method of oral hygiene instruction.

Acceptability of interdental brush was comparatively high in test group than control group. However, overall acceptance of interdental brush was regarded to be good. This is in agreement with previous studies that have shown that patient acceptance of interdental brush is higher compared with floss or other interdental aids.<sup>2</sup> On the contrary, few studies have reported patient preference of rubber interdental bristle over interdental brush.<sup>33,34</sup> As most participants responded that the use of interdental brushes chosen by means of the interdental access probe in the present study produced 'No discomfort', this method may be less traumatic and more acceptable. In the present study, at the exit time, majority of the participants expressed willingness to continue use of interdental brush in their daily routine. This is in line with a previous study that evaluated the client compliance for interdental care using interdental brush.

They also reported that patient-centred oral hygiene instruction and support are necessary to nurture the new behaviour until the patient becomes accustomed to the technique and routine.<sup>35</sup> Emphasis on individualized patient education for the use of calibrated interdental brush forms the strength of the current study. The limitations of the study are that this study was a preliminary study with two groups only. The follow-up period was short, that is 3 months. The present study was limited only to gingivitis cases. Also, the study comprised of limited sample size. The present study involved measurement of clinical parameters by single examiner and only at two time periods, that is baseline and at 3 months. Further

studies may be conducted to compare other oral hygiene instruction methods and different varieties of interdental brushes among larger population for longer duration of time, clinical observations at different time intervals and also among periodontitis patients.

## 5 | CONCLUSION

Within the limitations of the study, it can be concluded that Touch-to-Teach method of oral hygiene instruction is effective and more acceptable compared with conventional method of demonstration on model and videos thereby making the patient regularly use interdental brush.

## 6 | CLINICAL RELEVANCE

### 6.1 | Rationale for the study

Conventional oral hygiene instruction methods have been ineffective in achieving the desirable results. Individually trained oral prophylaxis (iTOP) based on Touch-to-Teach concept is a personalized approach that coaches the individual to use proper technique and tools for maintenance of oral hygiene. Utilizing this concept, regular use of interdental brush can be promoted.

### 6.2 | Principal findings

Individuals trained with Touch-to-Teach method were more regular in using interdental brush and had significant improvement in gingival health.

### 6.3 | Practical implications

Dental professionals can undergo training on individually trained oral prophylaxis (iTOP) and incorporate Touch-to-teach method of oral hygiene instructions in dental practice so as to achieve more predictable outcomes and patient adherence.

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## CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

## AUTHOR CONTRIBUTIONS

The sequence of author and their respective contribution is as mentioned below. The first author (APS) performed the initial screening, supragingival scaling and oral hygiene instructions.

The second author (PMLV) performed the clinical examinations at baseline and at follow-up visit. Manuscript preparation was done by both the authors. Randomization and allocation was done by the statistician.

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## REFERENCES

- Eren Kuru B, Ince Kuka G, Leman TO. Role of the mechanical interdental plaque control in the management of periodontal health: how many options do we have? *Gingival Disease - A Professional Approach for Treatment and Prevention*. IntechOpen; 2019. <https://doi.org/10.5772/intechopen.81082>
- Christou V, Timmerman MF, Van der Velden U, Van der Weijden FA. Comparison of different approaches of interdental oral hygiene: interdental brushes versus dental floss. *J Periodontol*. 1998;69:759-764.
- Berchier CE, Slot DE, Haps S, Van der Weijden GA. The efficacy of dental floss in addition to a toothbrush on plaque and parameters of gingival inflammation: a systematic review. *Int J Dent Hyg*. 2008;6:265-279.
- EFP provides clear guidance to public on interdental cleaning in response to media controversy about flossing - European Federation of Periodontology. <https://www.efp.org/news-events/news/efp-provides-clear-guidance-to-public-on-interdental-cleaning-in-response-to-media-controversy-about-flossing-29977/>. Accessed December 31, 2020.
- Kotsakis GA, Lian Q, Ioannou AL, Michalowicz BS, John MT, Chu H. A network meta-analysis of interproximal oral hygiene methods in the reduction of clinical indices of inflammation. *J Periodontol*. 2018;89:558-570.
- Lee JY, Park HJ, Lee HJ, Cho HJ. The use of an interdental brush mitigates periodontal health inequalities: The Korean National Health and nutrition examination survey (KNHANES). *BMC Oral Health*. 2019;19: <https://doi.org/10.1186/s12903-019-0858-6>
- Graziani F, Palazzolo A, Gennai S, et al. Interdental plaque reduction after use of different devices in young subjects with intact papilla: a randomized clinical trial. *Int J Dent Hyg*. 2018;16:389-396.
- Imai Pauline H, Hatzimanolakis PC. Interdental brush in type I embrasures: examiner blinded randomized clinical trial of bleeding and plaque efficacy. *Can J Dent Hyg*. 2011;45:25-32.
- Bourgeois D, Saliassi I, Llodra JC, Bravo M, Viennot S, Carrouel F. Efficacy of interdental calibrated brushes on bleeding reduction in adults: a 3-month randomized controlled clinical trial. *Eur J Oral Sci*. 2016;124:566-571.
- Sälzer S, Graetz C, Dörfer CE, Slot DE, Van der Weijden FA. Contemporary practices for mechanical oral hygiene to prevent periodontal disease. *Periodontology 2000*. 2020;84(1):35-44.
- Van Der Weijden FA, Slot DE. Efficacy of homecare regimens for mechanical plaque removal in managing gingivitis a meta review. *J Clin Periodontol*. 2015;42:S77-S91.
- Jönsson B, Abrahamsson KH. Overcoming behavioral obstacles to prevent periodontal disease: Behavioral change techniques and self-performed periodontal infection control. *Periodontol*. 2000;2020(84):134-144.
- Gray D, McIntyre G. Does oral health promotion influence the oral hygiene and gingival health of patients undergoing fixed appliance orthodontic treatment? A systematic literature review. *J Orthod*. 2008;35:262-269.
- Ahire M, Dani N, Muttha R. Dental health education through the brushing ROBOTUTOR: a new learning experience. *J Indian Soc Periodontol*. 2012;16:417-420.
- ITOP is not just about brushing teeth. <https://eu.dental-tribune.com/c/curaden-ag/news/itop-is-not-about-brushing-teeth-it-is-about-achieving-overall-health/>. Accessed March 3, 2021.
- Fenyő A, Tihanyi D. *The Effectivity of Oral Hygiene Routines Depending on the Method of Patient Education*. EuroPerio, 3-5 June 2015. [https://www.itop-dental.com/sites/default/files/archive/the\\_effectivity\\_of\\_oral\\_hygiene\\_routinesDepending\\_on\\_the\\_method\\_of\\_patient\\_education.pdf](https://www.itop-dental.com/sites/default/files/archive/the_effectivity_of_oral_hygiene_routinesDepending_on_the_method_of_patient_education.pdf). Accessed March 3, 2021.
- Soldani FA, Lamont T, Jones K, et al. One-to-one oral hygiene advice provided in a dental setting for oral health. *Cochrane Database Syst Rev*. 2018;10:CD007447. <https://doi.org/10.1002/14651858.CD007447.pub2>
- Trombelli L, Farina R, Silva CO, Tatakis DN. Plaque-induced gingivitis: case definition and diagnostic considerations. *J Periodontol*. 2018;89:S46-S73.
- Carrouel F, Llodra JC, Viennot S, Santamaria J, Bravo M, Bourgeois D. Access to interdental brushing in periodontal healthy young adults: a cross-sectional study. *PLoS One*. 2016;11:1-10.
- Bourgeois D, Saliassi I, Dussart C, et al. Educational outcomes of a new curriculum on interproximal oral prophylaxis for dental students. *PLoS One*. 2018;13:e0204564.
- Bourgeois D, Carrouel F, Llodra JC, Bravo M, Viennot S. A colorimetric interdental probe as a standard method to evaluate interdental efficiency of interdental brush. *Open Dent J*. 2015;9:431-437. <https://doi.org/10.2174/1874210601509010431>
- Video resources - European Federation of Periodontology. <https://www.efp.org/gum-diseases/video-resources/>. Accessed March 3, 2021.
- Bourgeois D, Bravo M, Llodra J-C, et al. Calibrated interdental brushing for the prevention of periodontal pathogens infection in young adults - a randomized controlled clinical trial. *Sci Rep*. 2019;9: <https://doi.org/10.1038/s41598-019-51938-8>.
- Carrouel F, Viennot S, Santamaria J, Veber P, Bourgeois D. Quantitative molecular detection of 19 major pathogens in the interdental biofilm of periodontally healthy young adults. *Front Microbiol*. 2016;7:840. <https://doi.org/10.3389/fmicb.2016.00840>
- Bourgeois D, David A, Inquimbert C, Tramini P, Molinari N, Carrouel F. Quantification of carious pathogens in the interdental microbiota of young caries-free adults. *PLoS One*. 2017;12:e0185804. <https://doi.org/10.1371/journal.pone.0185804>
- Inquimbert C, Bourgeois D, Bravo M, et al. The oral bacterial microbiome of interdental surfaces in adolescents according to carious risk. *Microorganisms*. 2019;7:319. <https://doi.org/10.3390/microorganisms7090319>
- Lee JH, Oh JY, Youk TM, Jeong SN, Kim YT, Choi SH. Association between periodontal disease and non-communicable diseases: A 12-year longitudinal health-examinee cohort study in South Korea. *Med*. 2017;96:e739824.
- Bourgeois D, Inquimbert C, Ottolenghi L, Carrouel F. Periodontal pathogens as risk factors of cardiovascular diseases, diabetes, rheumatoid arthritis, cancer, and chronic obstructive pulmonary disease—is there cause for consideration? *Microorganisms*. 2019;7:424.
- Amoo-Achampong F, Vitunac DE, Deeley K, Modesto A, Vieira AR. Complex patterns of response to oral hygiene instructions: longitudinal evaluation of periodontal patients. *BMC Oral Health*. 2018;18:72.
- Guzeldemir-Akcakanat E. Interdental brushes in maintaining periodontal health. *Oral Diseases*. IntechOpen. 2020. <https://doi.org/10.5772/intechopen.91392>
- Nardi GM, Sabatini S, Guerra F, Tatullo M, Ottolenghi L. Tailored Brushing Method (TBM): an innovative simple protocol to improve the oral care. *J Biomed*. 2016;1:26-31.
- Renz A, Ide M, Newton T, Robinson PG, Smith D. Psychological interventions to improve adherence to oral hygiene instructions in adults with periodontal diseases. *Cochrane Database Syst Rev*. 2007. <https://doi.org/10.1002/14651858.CD005097.pub2>

33. Ustaoglu G, Ercan E, Gümüş KÇ. Comparison of clinical efficacy and patient acceptance of interdental brush and silicone coated interdental pick: a randomized split-mouth, prospective clinical trial. *Clin Oral Investig*. 2020;24:2121-2127.
34. Abouassi T, Woelber JP, Holst K, et al. Clinical efficacy and patients' acceptance of a rubber interdental bristle. A randomized controlled trial. *Clin Oral Investig*. 2014;18:1873-1880.
35. Imai PH, Hatzimanolakis PC. Encouraging client compliance for interdental care with the interdental brush: the client's perspective. *Can J Dent Hyg*. 2010;44:56-60.

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