

Evaluation Of Brushing Techniques Taught By Dental Students In Children With Permanent Dentition

Research Article

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Abstract

Introduction: Tooth brushing is a crucial part of oral hygiene. It is essential to stop plaque formation and reduce the susceptibility to cavities. Brushing technique, frequency and duration of tooth brushing are important factors in plaque reduction. This is often quite difficult in children because it requires dexterity. Dental professionals need adequate information about children's oral hygiene to teach them and their parents. There are six methods of tooth brushing techniques. They differ in a number of aspects and are recommended for various age groups.

Aim: The aim of the study is to evaluate the commonly taught brushing techniques by Dental students for children with complete permanent dentition.

Materials and Method: The data of brushing techniques advised were retrieved from the case sheets of patients. The collected data was tabulated in Excel. The data is represented with the help of bar graphs and statistically analysed with the help of SPSS software. The statistical tests done were Chi square tests and Correlation analysis.

Results: Modified bass is the most preferred brushing technique with a prevalence of 55.9% followed by Fones technique with a prevalence of 36.5% for children with complete permanent dentition. Modified bass technique is most commonly preferred for males with a prevalence of 52.9%. According to the patient's age Modified bass technique is most commonly preferred for 16-17 years (60%) and Fones technique for 13 years (32.5%).

Conclusion: Within the limitations of the study, it shows that Modified bass technique is the most preferred brushing technique taught to the patients between the age group 13-17 years.

Keywords: Brushing; Plaque; Caries; Gingivitis; Prevalence.

Introduction

Toothbrush may be a well-known tool in oral care. Familiarity of youngsters with this device is vital. Effective tooth brushing aids in the management of cavity and periodontitis [38]. Dentists and Dental assistants need adequate information about children's oral hygiene to teach them and their parents [1]. Also tooth brushing twice daily under parent's supervision is suggested [7]. Parents can help children and keep them safe from possible hazardous events while brushing. Dental caries and gingivitis are common diseases affecting children [13]. It will cause pain, eating difficul-

ties, malnutrition, aesthetic problems, reducing self-estimation, and consequently decreasing quality of life. Their treatment is quite expensive and time consuming [32].

Dental plaque is a principal etiologic factor for cavity and gingivitis. Then, plaque removal from dental surfaces may help in management of both. The Toothbrush is the commonest tool for plaque removal [28]. Although tooth brushing has become a daily habit for most of the people, the frequency of using toothbrushes varies among people of various countries [14]. This is often harder in children, because it required manual dexterity which wasn't

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developed under age 8 years. Frequency of tooth brushing and duration are the significant factors in plaque reduction and caries prevention [20, 3]. Some previous studies indicate that children have low efficiency to adopt the tooth-brushing techniques given in caries prevention programmes. The friction and movements of toothbrushing is crucial. Using toothpaste that contains fluoride will significantly enhance the benefits of toothbrushing [34, 21]. Bad oral health can have extensive and unsightly consequences for the kid especially for medically compromised children. Tooth-aches, dental treatments and loss of the integrity of single teeth or maybe the dentition are often the direct consequences [12]. Thus proper oral health education not only helps to prevent caries and periodontal problems but also prevents children from unpleasant somatic, psychological, and social experiences [30, 27].

The different techniques of tooth brushing recommended these days date mainly from the 20th century. Manual toothbrushing has six methods that are recommended by dentists and dental associations [36]. They differ during a number of aspects and are recommended for various age and patient groups. The oldest toothbrushing method was described in 1913 by Fones and is suggested mainly for youngsters [18]. The Bass technique places emphasis on the removal of plaque from above and slightly below the gingival margin [18, 23]. Bass had been changed to the Modified Bass where the bristle position and predominantly horizontal brush movements within the Bass method are retained, but vertical and sweeping motions to make circles are added [25]. The Stillman technique is analogous to the Bass technique [19]. The vertical motions of the Stillman technique could also be combined with the Bass, as prescribed for the Modified Bass [4]. Charters suggested angling the comb head at 45° coronally to the margin instead of apically. Vibratory and slight rotary movement is then applied before moving to the subsequent group of teeth. An abnormal frenum may be an additive factor to plaque accumulation and may cause inhibition to proper tooth brushing [7]. The Scrub technique is the most simple technique, with the toothbrush held parallel to the gingiva and horizontal motions to scrub the gingival crevice in an ordered fashion [37, 4]. There are some modification techniques such as Hirschfeld's technique which is a modification of the Fone's technique where the circular motion is smaller and concentrated over the gingival crevice. Frequency and duration of brushing are usually included with recommendations concerning the tactic of toothbrushing for children [15].

This study aims to evaluate the commonly taught toothbrushing techniques by Dental students for children with complete permanent dentition in the Department of Pediatric dentistry. This

study brings attention to the unacceptably wide diversity in recommendations on tooth brushing techniques and helps in creating awareness among the children and parents.

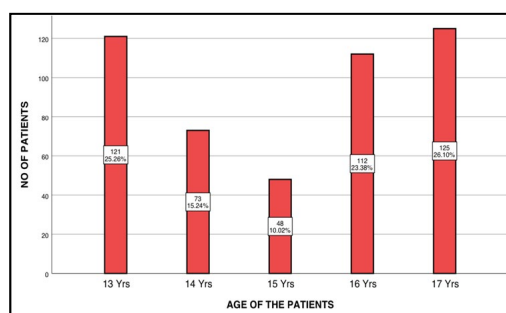
Materials And Method

This is a Retrospective cross sectional study conducted in a University setting. The study setting had certain advantages like flexibility in data collection and less expenditure. However the study had geographical limitations. It is also a unicentric study with no external validity. The ethical approval for the current study was obtained from the Institutional Review Board (Ethical approval number: SDC/SIHEC/2020/DIASDATA/0619-0320). The required data of patients was obtained from the case sheets of patients from June 2019 to March 2020 and reviewed. These patients were the outpatients of Pediatric Dentistry. A total number of 600 case sheets were reviewed. The inclusion criteria for the study were children between 13-17 years of age and complete records in the software. Exclusion criteria were the incomplete data and are excluded from the study. To minimise bias, random sampling was done. It has a high internal validity and low external validity. The final sample size of the study was 479. The necessary data such as Age, Gender and Type of brushing technique advised were collected and tabulated in Excel. The data was cross verified by the analyser. The tabulated data from Excel is imported to SPSS for statistical analysis. The data is represented by the means of bar graphs and the statistical tests used were Chi square and correlation analysis.

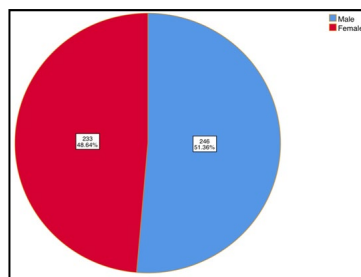
Results And Discussion

The study sample consists of 479 patients belonging to the age group of 13-17 years. The mean age of the patients for the study is 15 years (Graph 1). Based on the gender of the patients, 51.4% of the patients were males and 48.6% of the patients were females (Graph 2). The most commonly taught brushing technique for patients of age group 13-17 years is Modified bass technique ($p < 0.05$ - significant) with a prevalence of 55.9% followed by Fones method with a prevalence of 36.5% (Graph 3). Based on the age of the patients, Modified bass is mostly preferred for patients of age 16-17 years (60%) whereas Fones method is preferred mostly for 13 year old patients with a prevalence of 32.5% (Graph 4). Based on the gender of the patients, Modified bass technique is most commonly recommended for males than females with a prevalence of 52.9%, whereas Fones method showed no such gender preference (Graph 5). The results showed that Modified bass technique is the most commonly preferred

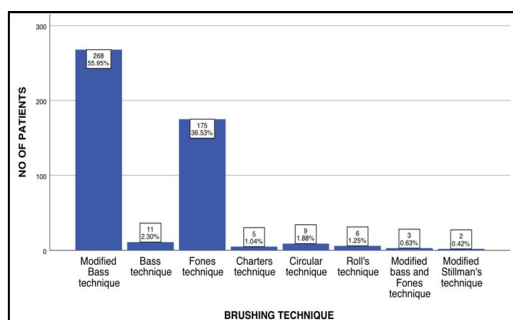
Graph 1. Bar chart representing the age distribution of the children taken for the study. X axis denotes the age of the patients and Y axis denotes the number of patients. Children of age group 13-17 years with complete permanent dentition were taken for the study. Children at 17 years of age were higher in the study population. (n=125, 26.1%).



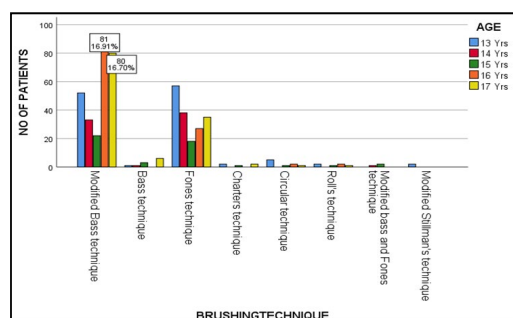
Graph 2. Pie chart representing the gender distribution of the children taken for the study. Blue colour denotes males and red colour denotes females. Among the study population, 51.36% of the children were males and 48.64% were females.



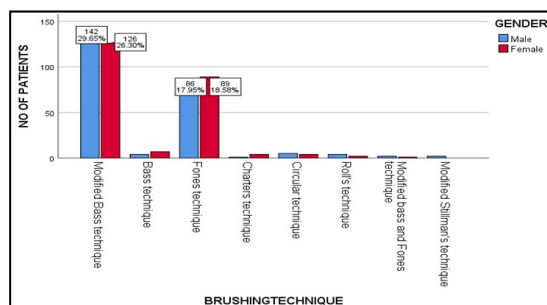
Graph 3. Bar chart representing the frequency of brushing techniques taught by dental students to children between 13-17years of age. X axis denotes the type of brushing technique advised and Y axis denotes the number of patients. Modified bass technique was the most frequently taught technique(55.95%) followed by Fones technique (36.53%).



Graph 4. Bar chart representing the frequency of brushing techniques advised based on the child's age. X axis denotes the type of brushing technique advised and Y axis denotes the number of patients. Modified bass technique was the most frequently taught technique at 16 and 17 years of age (16.91% and 16.7% respectively) which was statistically significant. (Chi square test, p=0.00 - statistically significant)



Graph 5. Bar chart representing the frequency of brushing techniques advised based on the child's gender. X axis denotes the type of brushing technique advised and Y axis denotes the number of patients. Modified Bass technique was advised more in the children who were males (29.65%), while Fones technique was taught equally to both males and females. (Chi square test, p=0.04 - statistically significant).



brushing technique for children of age group 13-17 years with complete permanent dentition.

In this study the brushing techniques were classified as Modified bass, Bass, Fones, Charters, Circular, Roll's and Modified Stillman's technique. The wide diversity in recommendations should be a matter of concern for the dental profession. The age group

of the patients taken for the study is 13-17 years to evaluate the brushing techniques advised for complete permanent dentition since mixed dentition persists upto 12 years of age. 54% of the patients were males and 48.6% of the patients were females. Plaque removal on a daily basis may be a central part of oral health prophylaxis [29]. Without proper oral hygiene there's a high risk for caries and gingivitis [35]. Accordingly, there's wide

consent that oral hygiene behavior is important for everybody and will begin with the primary tooth of a toddler. As this health behavior has got to be performed on a day to day, it's important to teach children to require up the responsibility for the prevention of caries and oral hygiene maintenance [22, 24].

From the data obtained, it is observed that Modified bass technique is the commonly taught technique for the children of 13-17 years of age with a prevalence of 55.9% followed by Fones method with a prevalence of 36.5%. Modified bass technique is considered to be the most effective brushing techniques according to previous studies. It has a better effect of plaque removal compared to the vertical method [22]. It is highly recommended for easy plaque control and it causes good gingival stimulation. Modified bass technique is suitable for short term effects but it couldn't sustain long term effects [2]. Possible reasons for the high frequency of recommending the Modified Bass technique is that there's some, but not excellent evidence, suggesting that the technique is better than other techniques in terms of improved plaque control and reducing gingival inflammation. However, there are some studies to add evidence to such findings. The evidence that does exist usually involves a little number of participants, with a brief follow-up, and ranging levels of bias. Moreover, few studies suggest that other brushing techniques are easier and simpler than the Modified Bass technique [6].

Based on the gender of the patients, Modified bass technique is preferred more among males than females. The possible reasons could be increased manual dexterity in males compared to females. According to the age of the patients, Modified bass technique is recommended for age group 16-17 years mostly. Dexterity of the wrist is required hence it is preferred in late childhood. Complex brushing techniques like Modified bass are technically more demanding compared to simpler techniques like Scrub or Fones. Therefore children will find the Modified bass technique more difficult to master [31]. There were large differences between the techniques recommended for adults and for youngsters. The Bass and Modified Bass methods were most often advocated for adults but not for youngsters. On the opposite hand, the Scrub and Fones techniques were more frequently recommended for youngsters [10]. Modified Bass Technique has been proven to get rid of enough of the plaque compared to normal tooth brushing technique on lingual and buccal sites. Dentists agree that using Modified Bass Technique over traditional tooth brushing is best in removing supragingival plaque [26]. When patients start to use a far better cleaning option like modified bass technique, their oral hygiene will improve generally [12]. There also are many studies that are done to match Modified Bass Technique with other available tooth cleaning methods and most of the time Modified Bass technique was proven to be superior to others [33, 26].

Fones method is the second highest recommended technique with a prevalence of 36.5%. Fones technique is commonly recommended for young children [16]. The average percentage of plaque removal in Fones technique was found to be 75.2%. It has a good gingival stimulation, good plaque removal and is easier to teach for children. However in Fones technique the interproximal areas are not cleaned and may sometimes cause trauma [8]. Fones technique is mostly recommended for patients of age 13 years since it is easy to learn in a short period of time. Fone's method has a good advantage in case of gingivitis and oral hygiene skills and it was easier to practice after a single training session as re-

ported in Research by Dental Tribune International [17]. Fone's method was easily understood and remembered by the children during the follow up. The Modified bass technique is superior in cleaning the interproximal areas and gingival third of the tooth, but it is more difficult to integrate into everyday life [5]. Since the children were taught in an institutionalised setting, it was easy for them to learn the brushing techniques. The evidence of the present study adds to the consensus and can be utilised for similar other confirmatory studies.

This study is limited by a few factors such as small sample size . It also has geographical limitations since it is a hospital setting . It is a unicentric study with no external validity. The sample size and duration of the study can be expanded. A multicentric study can be done on Effective brushing technique for plaque control, caries and periodontal problems prevention. A large sample size of people from different ethnicities would give better results for the study. Additional repeated population-based investigations covering extended time periods would help add important information in these areas and further validate the findings. Future research is required to raise understanding which factors impede adoption of tooth brushing recommendations in children and which efforts are necessary to enhance their tooth brushing abilities.

Conclusion

Within the limitations of the study, it shows that Modified bass technique is the most preferred brushing technique taught to the patients between the age group 13-17 years. Oral hygiene instruction should be adjusted to a child's development stage and motor skills. Variations in the ability of toothbrushing must be considered especially for young children.

References

- [1]. Alanazi KJ, Subhan SA, Alshehri HM, Aljaload MM, Aljafary MH, Alazmi MA, et al. Influence of tooth brush grips and brushing techniques on plaque removal efficacy. *J Dent Oral Health*. 2019;4(104):1-5.
- [2]. Alnakhli A, Omar OM. Effectiveness of two instruction methods in improving tooth brushing skills in children: A clinical trial. *J Adv Med Med Res*. 2016 Aug 18:1-5.
- [3]. Anwar AI, Zulkifli A, Syafar M, Jafar N. Effectiveness of counseling with cartoon animation audio-visual methods in increasing tooth brushing knowledge children ages 10-12 years. *Enferm Clin*. 2020 Mar;30 Suppl 2:285-288. Pubmed PMID: 32204167.
- [4]. Ausenda F, Jeong N, Arsenault P, Gyurko R, Finkelman M, Dragan IF, et al. The Effect of the Bass Intraulcular Toothbrushing Technique on the Reduction of Gingival Inflammation: A Randomized Clinical Trial. *J Evid Based Dent Pract*. 2019 Jun;19(2):106-114. Pubmed PMID: 31326043.
- [5]. B, N, Nandlal, B. 'Change in Skills Observed with a Novel Brushing Technique Based on Sequence Learning; Evaluated Through Video Bio-Feedback System in Children', *Journal of Oral Hygiene & Health*. 2013. doi: 10.4172/2332-0702.1000115.
- [6]. Ceyhan D, Akdik C, Kirzioglu Z. An educational programme designed for the evaluation of effectiveness of two tooth brushing techniques in preschool children. *Eur J Paediatr Dent*. 2018 Sep 1;19(3):181-6.
- [7]. Christabel SL, Gurunathan D. Prevalence of type of frenal attachment and morphology of frenum in children, Chennai, Tamil Nadu. *World J Dent*. 2015 Oct;6(4):203-7.
- [8]. Deolia S, Johnny J, Patil MS, Lanje NR, Patil AV. Effectiveness of Audio-taped Performance Technique to improve the oral hygiene status of visually impaired schoolchildren. *J Indian Soc Pedod Prev Dent*. 2019 Apr-Jun;37(2):172-176. Pubmed PMID: 31249182.
- [9]. Gibson JA, Wade AB. Plaque removal by the Bass and Roll brushing techniques. *J. Periodontol*. 1977 Aug 1;48(8):456-9.
- [10]. Gluch JI. As an adjunct to tooth brushing, interdental brushes (IDBs) are more effective in removing plaque as compared with brushing alone or the combination use of tooth brushing and dental floss. *J Evid Based Dent Pract*.

- 2012 Jun 1;12(2):81-3.
- [11]. Govindaraju L, Gurunathan D. Effectiveness of Chewable Tooth Brush in Children-A Prospective Clinical Study. *J Clin Diagn Res.* 2017 Mar;11(3):ZC31-ZC34.Pubmed PMID: 28511505.
- [12]. Govindaraju L, Jeevanandan G, Subramanian E. Clinical Evaluation of Quality of Obturation and Instrumentation Time using Two Modified Rotary File Systems with Manual Instrumentation in Primary Teeth. *J Clin Diagn Res.* 2017 Sep;11(9):ZC55-ZC58.Pubmed PMID: 29207834.
- [13]. Govindaraju L, Jeevanandan G, Subramanian EMG. Comparison of quality of obturation and instrumentation time using hand files and two rotary file systems in primary molars: A single-blinded randomized controlled trial. *Eur J Dent.* 2017 Jul-Sep;11(3):376-379.Pubmed PMID: 28932150.
- [14]. Govindaraju L, Jeevanandan G, Subramanian EM. Knowledge and practice of rotary instrumentation in primary teeth among indian dentists: A questionnaire survey. *J Int Oral Health.* 2017 Mar 1;9(2):45.
- [15]. Gurunathan D, Shanmugaavel AK. Dental neglect among children in Chennai. *J Indian Soc Pedod Prev Dent.* 2016 Oct 1;34(4):364.
- [16]. Harnacke D, Mitter S, Lehner M, Munzert J, Deinzer R. Improving oral hygiene skills by computer-based training: a randomized controlled comparison of the modified Bass and the Fones techniques. *PLoS One.* 2012;7(5):e37072.Pubmed PMID: 22629353.
- [17]. Harnacke D, Stein K, Stein P, Margraf-Stiksrud J, Deinzer R. Training in different brushing techniques in relation to efficacy of oral hygiene in young adults: a randomized controlled trial. *J Clin Periodontol.* 2016 Jan;43(1):46-52.Pubmed PMID: 26660396.
- [18]. Ilyas M, Ashraf S, Jamil H. Tooth brushing techniques. *Professional Med J.* 2018 Jan 10;25(01):135-9.
- [19]. Janakiram C, Varghese N, Venkitachalam R, Joseph J, Vineetha K. Comparison of modified Bass, Fones and normal tooth brushing technique for the efficacy of plaque control in young adults- A randomized clinical trial. *J Clin Exp Dent.* 2020 Feb 1;12(2):e123-e129.Pubmed PMID: 32071693.
- [20]. Jeevanandan G. Kedo-S Paediatric Rotary Files for Root Canal Preparation in Primary Teeth - Case Report. *J Clin Diagn Res.* 2017 Mar;11(3):ZR03-ZR05.Pubmed PMID: 28511532.
- [21]. Jeevanandan G, Govindaraju L. Clinical comparison of Kedo-S paediatric rotary files vs manual instrumentation for root canal preparation in primary molars: a double blinded randomised clinical trial. *Eur Arch Paediatr Dent.* 2018 Aug;19(4):273-278.Pubmed PMID: 30003514.
- [22]. Joybell C, Krishnan R, V SK. Comparison of Two Brushing Methods-Fone's vs Modified Bass Method in Visually Impaired Children Using the Audio Tactile Performance (ATP) Technique. *J Clin Diagn Res.* 2015 Mar;9(3):ZC19-22.Pubmed PMID: 25954698.
- [23]. Kaur K. 'Brushing Teeth', *Brushing Teeth.* 2019;1-6. doi: 10.4324/9780429323492-1.
- [24]. Nair M, Jeevanandan G, Vignesh R, Subramanian EM. Comparative evaluation of post-operative pain after pulpectomy with k-files, kedo-s files and mtwo files in deciduous molars-a randomized clinical trial. *Braz. Dent. Sci.* 2018 Oct 24;21(4):411-7.
- [25]. Packiri S, Gurunathan D, Selvarasu K. Management of paediatric oral ranula: a systematic review. *J Clin Diagn Res.* 2017 Sep;11(9):ZE06-ZE09.
- [26]. Padbury AD. A Comparative Study of Abrasion Caused by Three Methods of Toothbrushing: A Thesis Submitted in Partial Fulfillment... Periodontics... University of Michigan; 1968.
- [27]. Panchal V, Jeevanandan G, Subramanian E. Comparison of instrumentation time and obturation quality between hand K-file, H-files, and rotary Kedo-S in root canal treatment of primary teeth: A randomized controlled trial. *J Indian Soc Pedod Prev Dent.* 2019 Jan-Mar;37(1):75-79.Pubmed PMID: 30804311.
- [28]. Penteado LA, Sanada IW, Curvéllo LV, Sanada JT. Knowledge of undergraduates in dentistry about tooth brushing techniques. *J. Dent. Res.* 2014 Jul 1;2(4):360-8.
- [29]. Ramakrishnan M, Bhurki M. Fluoride, Fluoridated Toothpaste Efficacy And Its Safety In Children-Review. *Int. J. Pharm. Sci. Res.* 2018 Oct 1;10(04):109-14.
- [30]. Ravikumar D, Jeevanandan G, Subramanian EM. Evaluation of knowledge among general dentists in treatment of traumatic injuries in primary teeth: A cross-sectional questionnaire study. *Eur. J. Dent.* 2017 Apr;11(02):232-7.
- [31]. Smutkeeree A, Rojllakkanawong N, Yimcharoen V. A 6-month comparison of toothbrushing efficacy between the horizontal Scrub and modified Bass methods in visually impaired students. *Int J Paediatr Dent.* 2011 Jul;21(4):278-83.Pubmed PMID: 21332852.
- [32]. Sari DO, Abdillah AD, Nugrahaeni DK. The Relation Between Parent's Role and Children's Brushing Techniques Toward Gingivitis Incident on Children from Selected Primary School in Cimahi. *KnE Life Sciences.* 2019:171-8.
- [33]. Shick RA. A Clinical Evaluation of the Vertical Technic of Toothbrushing with an Adjustable Head Toothbrush: A Thesis Submitted in Partial Fulfillment... Periodontics... University of Michigan; 1960.
- [34]. Somasundaram S, Ravi K, Rajapandian K, Gurunathan D. Fluoride Content of Bottled Drinking Water in Chennai, Tamilnadu. *J Clin Diagn Res.* 2015 Oct;9(10):ZC32-4.Pubmed PMID: 26557612.
- [35]. Subramanyam D, Gurunathan D, Gaayathri R, Vishnu Priya V. Comparative evaluation of salivary malondialdehyde levels as a marker of lipid peroxidation in early childhood caries. *Eur J Dent.* 2018 Jan-Mar;12(1):67-70. Pubmed PMID: 29657527.
- [36]. 'Tooth brushing and gingival recession' (2008) *Dental Abstracts*, p. 270. doi: 10.1016/j.denabs.2008.04.040.
- [37]. Wade, A. B. and Bryan Wade, A. (1978a) 'Importance of filament diameter when using Bass brushing technique', *Journal of Dentistry*, p. 281. doi: 10.1016/0300-5712(78)90287-7.
- [38]. Wade, A. B. and Bryan Wade, A. (1978b) 'Plaque removal by the Bass and Role brushing techniques', *Journal of Dentistry*, p. 281. doi: 10.1016/0300-5712(78)90286-5.