



Evaluation of brushing techniques taught by dental students in children with permanent dentition

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Article History:

Received on: 11 Sep 2020

Revised on: 02 Oct 2020

Accepted on: 12 Oct 2020

Keywords:

Brushing,
Plaque,
Caries,
Gingivitis,
Prevalence

ABSTRACT

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. The aim of the study is to evaluate the commonly taught brushing techniques by Dental students for children with complete permanent dentition. The data of brushing techniques advised were retrieved from the case sheets of patients. The collected data were 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. 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. The 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%). Within the limitations of the study, it shows that the Modified bass technique is the most preferred brushing technique taught to the patients between the age group 13-17 years.



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ISSN: 0975-7538

DOI: <https://doi.org/10.26452/ijrps.v11iSPL3.3484>

Production and Hosted by

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INTRODUCTION

A toothbrush may be a well-known tool in oral care. The familiarity of youngsters with this device is vital. Effective tooth brushing aids in the management of cavity and periodontitis (Wade, 1978). Dentists and Dental assistants need adequate information about children's oral hygiene to teach them and their parents (Alanazi *et al.*, 2017). Also, tooth brushing twice daily under parent's supervision is suggested (Gibson and Wade, 1977). Parents can help children and keep them safe from possible hazardous events while brushing. Dental caries and gingivitis are common diseases affecting children (Govindaraju *et al.*, 2017b). It will cause pain, eating difficulties, malnutrition, aesthetic problems,

reducing self-estimation, and consequently decreasing quality of life. Their treatment is quite expensive and time-consuming (Sari *et al.*, 2019).

Dental plaque is a principal etiologic factor for cavity and gingivitis. Then, plaque removal from dental surfaces may help in the management of both. The Toothbrush is the commonest tool for plaque removal (Pentado *et al.*, 2014) Although tooth brushing has become a daily habit for most of the people, the frequency of using toothbrushes varies among people of various countries (Govindaraju *et al.*, 2017c). This is often harder in children because it required manual dexterity which wasn't developed under age eight years. Frequency of tooth brushing and duration are the significant factors in plaque reduction and caries prevention (Jeevanandan, 2017; Anwar, 2020). 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 are crucial. Using toothpaste that contains fluoride will significantly enhance the benefits of toothbrushing (Somasundaram, 2015; Jeevanandan and Govindaraju, 2018). Bad oral health can have extensive and unsightly consequences for the kid, especially for medically compromised children. Toothaches, dental treatments and loss of the integrity of single teeth or maybe the dentition are often the direct consequences (Govindaraju *et al.*, 2017a). 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 (Ravikumar *et al.*, 2017; Panchal *et al.*, 2019).

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. Bass technique emphasises on the removal of plaque from above and slightly below the gingival margin (Ilyas *et al.*, 2018). Modified Bass differs from Bass with the vertical and sweeping motions added to the Bass method (Packiri, 2017). The Stillman technique (Janakiram *et al.*, 2020) has vertical motions combined with the Bass, as prescribed for the Modified Bass (Ausenda *et al.*, 2019). Charters suggested angling the brush at 45° coronally to the margin. Vibratory and slight rotary movement is then applied before moving to the subsequent group of teeth (Christabel, 2015). 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 (Ausenda *et al.*, 2019; Gurunathan and Shanmugaavel, 2016).

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.

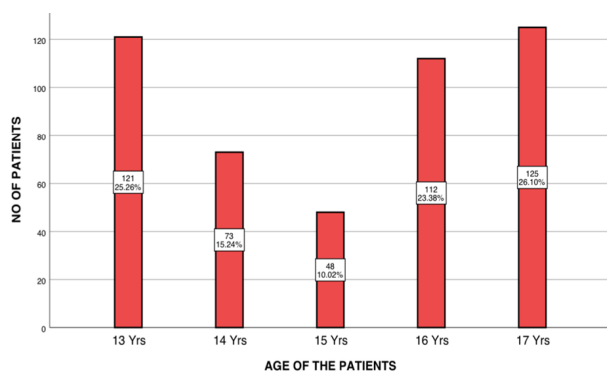
MATERIALS AND METHODS

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 were 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 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 means of bar graphs and the statistical tests used were Chi-square and correlation analysis.

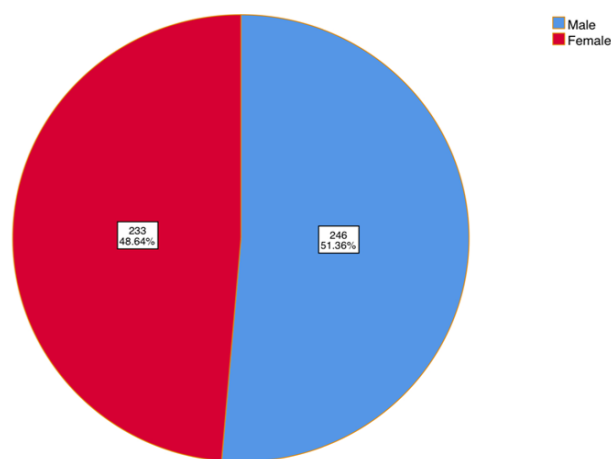
RESULTS AND DISCUSSION

The study sample consists of 479 patients belonging to the age group of 13-17 years, 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%). The mean age of the patients taken 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 a 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). The 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. ($p=0.00$). 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). Modified Bass technique was advised more in the children who were males (29.65%), while the Fones technique was taught equally to both males and females. ($p=0.04$). The results showed that the Modified bass technique is the most commonly preferred brushing technique for children of the age group 13-17 years with complete permanent dentition.

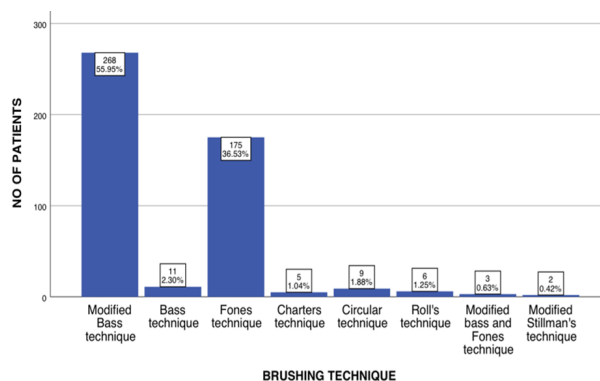


Graph 1: Bar chart representing the age distribution of the children taken for the study

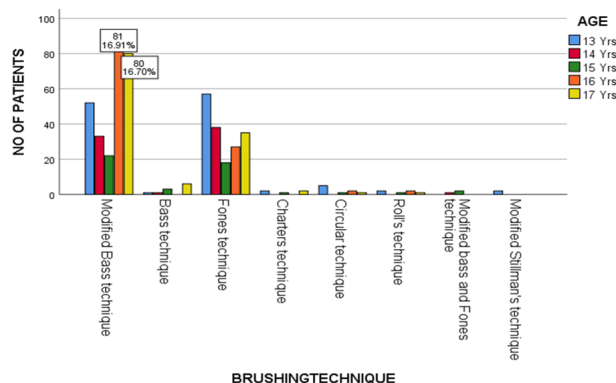


Graph 2: Pie chart representing the gender distribution of the children taken for the study.

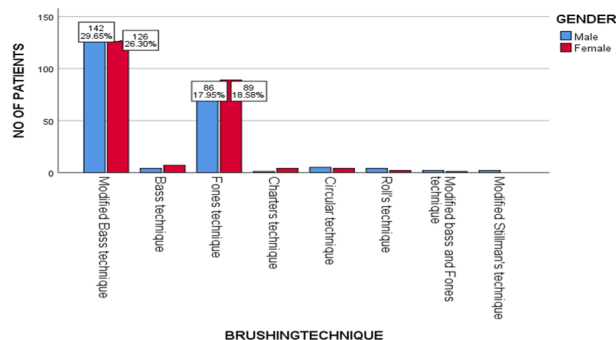
In this study, the brushing techniques were classified as Modified bass, Bass, Fones, Charters, Circular, Roll's and Modified Stillman's technique. The wide diversity in recommendations should be a matter of concern for the dental profession. The age



Graph 3: Bar chart representing the frequency of brushing techniques taught by dental students to children between 13-17 years of age.



Graph 4: Bar chart representing the frequency of brushing techniques advised based on the child's age.



Graph 5: Bar chart representing the frequency of brushing techniques advised based on the child's gender.

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 up to 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 (Ramakrishnan and Shukri, 2018). Without proper oral hygiene, there's a high risk for caries and gingivitis (Subramanyam, 2018). Accordingly, there's wide consent that oral hygiene behaviour is important for everybody and will begin with the primary tooth of a toddler. As this health behaviour has got to be performed on a day today, it's important to teach children to require up the responsibility for the prevention of caries and oral hygiene maintenance (Joybell, 2015; Nair et al., 2018).

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%. The 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 (Joybell, 2015). It is highly recommended for easy plaque control and it causes good gingival stimulation. The modified bass technique is suitable for short term effects, but it couldn't sustain long term effects (Alnakhli and Omar, 2016). 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, a few studies suggest that other brushing techniques are easier and simpler than the Modified Bass technique (Ceyhan et al., 2018).

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 the 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 (Smutkeeree et al., 2011). 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 (Gluch, 2012). 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 the Modified Bass Technique over traditional tooth brushing is best in removing supragingival plaque. When patients start to use a far better cleaning option like modified bass technique, their oral hygiene will generally improve (Govindaraju, 2017). 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 (Shick and Michigan, 1960).

Fones method is the second-highest recommended technique with a prevalence of 36.5%. Fones technique is commonly recommended for young children (Harnacke et al., 2012). 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 (Johny et al., 2019). 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 reported in Research by Dental Tribune International (Harnacke et al., 2016). 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 (Nandlal, 2013). 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 the 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 the 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 tooth-brushing must be considered especially for young children.

Acknowledgement

The authors of this study acknowledge the institute, for their help towards collecting all the patient case records and other data in relevance to the current study.

Conflict of Interest

The authors declare that there are no conflicts of interest for this study.

Funding Support

The authors declare that they have no funding support for this study.

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