

# TYPE OF TOOTHBRUSH AND BRUSHING TECHNIQUES USED AMONGST SENIOR HIGH SCHOOL STUDENTS IN KUMASI

Abu-Sakyi J<sup>1</sup>, Gaba Ayikwei C<sup>2</sup>, Adu-Ababio F<sup>2</sup>., Oti Acheampong A<sup>3</sup>, Gowans J<sup>3</sup>

<sup>1</sup>Kwame Nkrumah University of Science and Technology (KNUST) Hospital, Dental Department. Kumasi, Ghana.

<sup>2</sup>Department of Community Dentistry, KNUST Dental School, Kumasi, Ghana

<sup>3</sup>Department of Oral and Maxillofacial surgery Komfo Anokye Teaching Hospital.

**Corresponding Author: Dr. Abu-Sakyi E-mail:** kmanudecember@gmail.com;

## ABSTRACT

**BACKGROUND:** Tooth brushing is an essential part of an oral hygiene routine. This routine typically includes the use of a toothbrush and toothpaste. The current day toothbrush consists of a head of tightly clustered bristles mounted on a handle, which facilitates the cleansing of both accessible and hard-to-reach areas in the mouth. An appropriate tooth brushing habit is defined as brushing at least twice daily for two minutes with a brushing force of less than three Newtons (3N) and circling or sweeping vertical movements using a soft to a medium bristle toothbrush.

**OBJECTIVE:** To determine tooth brushing techniques and the types of toothbrushes used among Senior High School Students in Kumasi.

**MATERIALS AND METHODS:** This was a cross-sectional quantitative survey conducted amongst students in second-cycle institutions in the Kumasi Metropolitan Area. The Armed Forces Senior High Technical School was selected for the study through simple random selection, and 122 respondents were interviewed using a standardized questionnaire.

**RESULTS:** Medium, hard, and soft-bristled toothbrushes were used by 62 (50.8%), 43(35.2%), and 16(13.0%) of the respondents, respectively. The Combination, Vertical, and Horizontal brushing methods were preferred by 44(36.1%), while the least adopted methods were the Circular (10, 8.2%). And Random (10, 8.2%).

**DISCUSSION:** The combination of vertical and horizontal brushing was highest, while the recommended modified Bass technique was practiced by only 15 (12.3%) respondents.

**CONCLUSION:** The study has exposed a need for a further drive on awareness initiatives that focus on tooth brushing techniques among senior high school students.

**KEYWORDS:** toothbrush, bristles, brushing technique, high school students

## INTRODUCTION

Tooth brushing tools date back to 3500-3000 BC when the Babylonians and the Egyptians made a brush by fraying the end of a twig. Tombs of the ancient Egyptians have been found to contain tooth sticks alongside their owner's remains. Around 1600BC, the Chinese developed "chewing sticks" which were made from aromatic tree twigs to freshen breath<sup>1</sup>.

The first toothbrush of a more modern design was made by William Addis in England around 1780 – the handle was carved from cattle bone, and the brush portion was made from swine bristles. In 1844, the first 3-row bristle brush was designed. Natural bristles were the only source of bristles until Du Pont invented nylon. The invention of nylon started developing the truly modern toothbrush in 1938, and by the 1950s, softer nylon bristles were being made. People preferred these softer bristle brushes. The first electric toothbrush was made in 1939, and the first electric toothbrush in the US was the Broxodent in 1960<sup>2</sup>.

Tooth brushing is an essential part of an oral hygiene routine. This routine typically includes the use of a

toothbrush and toothpaste. Modern-day toothbrushes consist of a head of tightly clustered bristles mounted on a handle, which facilitates the cleansing of both accessible and hard-to-reach areas in the mouth. While some modern toothbrushes have embraced the latest technological advances and can glean information ranging from stroke pressure to oral hygiene habits, the early toothbrushes were very different regarding sophistication<sup>3</sup>.

Appropriate tooth brushing habits have been defined as brushing at least twice daily for two (2) minutes with a brushing force of less than three (3) Newtons and circling or sweeping vertical movements using a soft to medium bristle toothbrush<sup>4</sup>. This implies that the technique of holding a toothbrush and the type of toothbrush used (soft, medium, and hard) all affect the efficiency of tooth brushing for effective plaque control, and consequently, maintenance of a good oral hygiene status. The most effective and recommended method is the modified bass technique<sup>5</sup> (placing brush at 45 degrees to the tooth surface with gentle circular and vibratory motion and finally sweeping motion towards the chewing surface.)

The most common oral diseases are caries and periodontitis, and these are preventable with effective plaque control<sup>6</sup>. Therefore, proper tooth brushing techniques and the correct type of toothbrushes are essential to maintain oral health. By following the proper tooth brushing techniques, one will remove food debris and plaque, which will prevent the onset of Dental Caries.

The main reason for Dental caries is food lodgment in between and on top of teeth, which provide sustenance for the bacteria residing in the Oral cavity. The microorganisms consume the debris on the teeth producing acid as by-product, leading to the demineralization of the Enamel and thus to caries.

The main objective of this study was to determine tooth brushing techniques and the types of toothbrushes used among Senior High School Students in Kumasi. The specific objectives were to determine: percentage of people that use a toothbrush to clean their teeth, the type of toothbrushes they use, the frequency and duration of brushing, and the technique of tooth brushing they use.

**MATERIALS AND METHODS**

The research design adopted was a cross-sectional quantitative survey. This study was conducted from March to May 2018 and targeted students of second-cycle institutions in the Kumasi Metropolitan area. By a simple random selection, the Armed Forces Senior High Technical School was selected as the School of Choice to conduct the research. The sample size was determined using the equation<sup>7</sup>

$$sample\ size(n) = \frac{(z^2 * p(1-p))/e^2}{1 + \frac{(z^2 * p(1-p))}{e^2 * N}}$$

The sample size was 174 participants. Due to the absence of the third-year students before the completion of data collection, 122 remaining students responded to the standardized questionnaire.

Ethical approval was obtained from the Committee on Human Research, Publications and Ethics of Kwame Nkrumah University of Science and Technology and School of Medical Sciences. Every effort was employed to ensure that informed consent was obtained from every participant. A thorough explanation of the objectives of the study was provided to all potential study participants. Participants were given ample opportunity to ask questions or decline participation. All participants were advised that they could withdraw from the study at any time, and that their confidentiality and anonymity would be assured at all times.

**RESULTS**

Respondents' ages ranged between 14-20 years, with a mean age of 17. Males constituted 79(64.75%) and females 43(35.25%). All 122 respondents used toothbrushes as a cleaning tool for their teeth.

**Table 1: Texture of the bristles of brushes used by the students.**

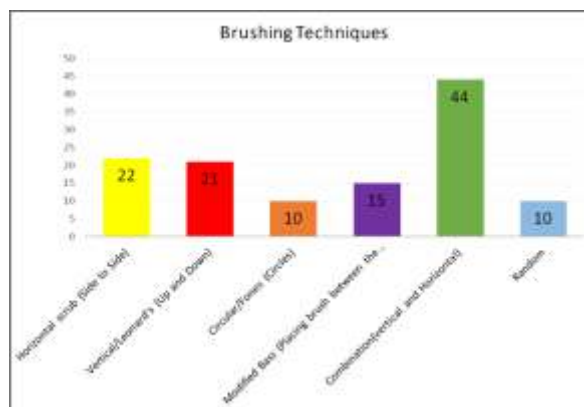
Texture of Toothbrush	Frequency	Percentage
Soft	16	13.11
Medium	63	51.64
Hard	43	35.25
Total	122	100.00

In Table 1 it is observed that the majority of students, 79 (64.75%) used soft to a medium toothbrushes for brushing their teeth while 43 (35.25%) used hard bristled toothbrushes.

**Table 2: Frequency of brushing and Duration of brushing**

Frequency of brushing teeth	frequency	Duration of brushing	frequency	Percent
Once-daily	64	30 seconds	56	45.90
Twice daily	58	1-2 minutes	50	40.98
More than twice daily	0	More than 2 minutes	16	13.12
Total	122	Total	122	100

From the above table, 58(47.54%) brushed twice daily while 64(52.46%) brushed once daily. Concerning the duration of brushing, 56(45.90%) respondents brushed for 30 seconds, 50(40.98%) brushed for 1-2 minutes, and only 16 (13.12%) brushed for more than 2 minutes.



**Fig 1. Distribution of the various brushing techniques adopted by the students.**

**DISCUSSION:**

The number of students who used toothbrushes to clean their teeth was 122(100%). This result is similar to a study<sup>8</sup> in 2015, where 94.4% of the students used a toothbrush to clean their teeth. There is a high level of awareness and practice of toothbrushing for cleaning teeth. However, other work has shown that many people who use toothbrushes still have poor oral hygiene status<sup>9</sup>. This indicates that tooth brushing is a technical and scientific procedure and must be done systematically and not just mechanically.

The texture of brushes preferred by respondents in this study is shown in Table 1. About 52% of respondents used medium bristled brushes in contrast with an earlier study done in the same area,<sup>10</sup> where the majority used hard-bristled brushes. This variation may be due to differences in the educational levels of respondents in the two studies. This study was amongst senior high school students, whereas the earlier study<sup>10</sup> was amongst the general population. A considerable number of respondents, 32.5 % in the current study, used hard-bristled brushes. For instance, in this research (Table 1) only 15, (12.30%) practice modified bass technique which is the recommended technique for tooth brushing<sup>5</sup>. This leaves much room for education on tooth brushing.

On the frequency of tooth brushing, a greater percentage 63 (51.6%) said they brushed their teeth once a day. The remaining 59 (48.4%) brushed twice a day. No respondent brushed more than two times a day. A similar work done<sup>8</sup> in 2015 showed an opposite finding where most respondents (53.20%) brushed their teeth twice a day, while 46% brushed once daily.

In another study<sup>13</sup>, most participants (77%) brushed twice a day, while 12% brushed just once a day. Furthermore, in a study<sup>14</sup> among university students in Port Harcourt, Nigeria, studying their brushing habits, 90% of the study population brushed at least once a day.

According to Beni's study<sup>9</sup> in Ho, most subjects 59.9%, reported using the prescribed oral cleaning practice of brushing twice a day.

This study showed that 45% of the 122 participants spent only 30 seconds brushing their teeth. This was closely followed by 41% of the participants, who spent 1-2 minutes brushing their teeth.

Only 14% of the participants spent more than 2 minutes brushing their teeth. In a study conducted by Mohammed and others,<sup>8</sup> 48.80% of the student population brushed for 1-2 minutes while 40.80% brushed for more than 2 minutes, and 14.40% brush their teeth for 30 seconds. This result contrasts with the results from this study, where the majority spent only 30 seconds brushing their teeth. Two similar studies<sup>11,13</sup> also recorded 1-2 minutes as the time spent by the majority of their respondents in brushing their teeth.

### Tooth brushing techniques

It has also been proven that the Modified Bass technique is the most effective plaque removal<sup>15,17</sup> method.

Fones method (Circular or round movements) is recommended mainly for children. In Horizontal scrub, bristles are activated in a gentle horizontal scrubbing motion, whereas in the Vertical technique (Leonard's), up and down strokes with the bristles placed on the gingiva towards the roots and an up (mandible) or down (maxilla) stroke towards the occlusal surface is done. In the Modified Bass technique, the bristle is positioned 45 degrees to the tooth surface into the sulcus, with gentle Circular, vibratory, and finally sweeping motions towards

the chewing surface. The Combination method uses a vertical and horizontal method of brushing in an alternating manner.<sup>19</sup>

The most common brushing technique used by the respondents was the Combination technique (Vertical and Horizontal Scrub). This was followed by the Horizontal Scrub (n=22, 18%) and Vertical (n=21, 17.2%). Only 15 respondents practiced the modified bass technique, while ten respondents brushed with random brush motions. In a previous research work<sup>8</sup> done in 2015, 34.8% use random, 27.2% use horizontal, 18% use vertical.

Beals and others<sup>11</sup> also recorded that the Horizontal method was the commonest technique followed by vertical and Combination (horizontal /vertical). These different methods practiced may be due to the unacceptably large diversity in dentists' recommendations on what tooth brushing method to use.<sup>16</sup> It is also possible that the respondents do not know the right way of brushing.

A study comparing the efficacy of horizontal scrub, Fones and Modified Bass, on 6-8 year olds<sup>12</sup> modified Bass was found to be most efficacious. In contrast, Muller-Bolla and others<sup>20</sup> found the horizontal technique to be the most effective up to 6 to 7 years of age. They also concluded that for older children at the stage of the late mixed dentition, the technique adopted by the child be modified to improve brushing quality without favouring a particular technique.

Several other researchers have also proven that Modified bass technique is the most effective at plaque removal<sup>14,16,17</sup>.

### CONCLUSION

The combination of vertical and horizontal brushing was highest probably due to lack of knowledge on how to brush, whilst 15 (12.3%) respondents practiced the recommended modified Bass technique. The study has exposed a need for further efforts on awareness initiatives concerning tooth brushing techniques among senior high school students.

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