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Assessment of User Satisfaction of Bamboo Toothbrush in Dental Students- A Clinical Study

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Abstract

There are a lot of innovative toothbrushes on the market right now. The bamboo toothbrush is the most environmentally friendly choice available. Few studies have been done in our region to yet that show how effective bamboo tooth brushes are at preserving oral hygiene. There is a lack of research in this space to give consumers the information about efficacy of these toothbrushes and they can be effective alternatives for conventional plastic toothbrushes. So, this study has been designed to assess user satisfaction and effectiveness of bamboo toothbrushes.

Keywords: Patient's satisfaction, Bamboo Tooth-brush, environment friendly

Introduction

Dental plaque is a very varied structural entity that forms when bacteria sequentially colonize tooth surfaces, restorations, or prosthetic components. It is a sticky, pale yellowish material that adheres to the tooth surface either below the gingival margin (subgingival plaque) or above it (supragingival plaque)[1,2] Plaque is a distinct but incredibly diverse formation that arises from the colonization and proliferation of bacteria on the surface of teeth, according to the WHO (1978). It is composed of different microorganisms and their byproducts, all of which are encased in extracellular matrix.[3] There are various methods for plaque control. Effective plaque control methods can be divided into two categories: chemical and mechanical. The simplest and least expensive way to maintain dental health is to wash your teeth properly.[4] For plaque control to be extremely effective, the types of toothbrushes used, their design, brushing technique, and brushing duration are crucial.[5] There are currently many herbal formulations available that address the makeup of toothpaste used for brushing. In a similar vein, improvements in toothbrush types are being produced, which may enable the incorporation of a natural antibiofilm impact.[6] Ridge gourd, coconut, and

bamboo fibers are used in traditional Indian methods. With bristles made of horse mane and totally recyclable nylon, the bamboo and neem toothbrush has a handle made of bamboo and neem. Biodegradable and eco-friendly, this bamboo toothbrush decomposes organically when thrown away. Natural toothbrushes have a number of advantages, such as their antimicrobial, anti-inflammatory, abrasive, and noteworthy capacity to prevent plaque accumulation. Apart from this, Globally, there is growing pressure to reduce carbon emissions and the use of single-use plastics, as well as to practice sustainability more generally. Over 4.7 billion toothbrushes are thought to be made annually, and it takes them 700–1000 years to break down.[7] A growing number of businesses and individuals are deliberately and unconsciously doing life cycle evaluations (LCAs), which quantify the environmental effect of various goods and services. Many people think that bamboo toothbrushes are more like single-use items and can't survive the three months that regular plastic toothbrushes are supposed to last.

Another misconception is that they are not as effective at cleaning teeth as a manual toothbrush made of plastic. Not enough research has been done in this area to provide consumers with the knowledge they need regarding the effectiveness of these toothbrushes. Thus, the purpose of this study is to evaluate user satisfaction of bamboo toothbrushes among dental students.

Materials & Methods

This randomized control trial was performed at Dept of Periodontics, GDC Aurangabad. Fifty (50) new adult bamboo toothbrushes (Bamboo Buddy, Kaderis Pty Ltd; see figures 5 & 7) and 50 new Colgate 360 Soft Toothbrushes (Colgate-Palmolive; see figures 6 & 8) were individually placed into a sealed opaque envelope and shuffled in a large box. Eighty dental students from college were selected for the study. These students were randomly divided into two groups, i.e. TB-1 (Bamboo toothbrush) TB-2 (Plastic toothbrush) with 40 participants in each group. These patients were contacted by telephone and instructed not to brush their teeth for 24 hours prior to attended the practice. The rationale of this was to ensure that they had a reasonable baseline of plaque present on their teeth. Plaque index, modified sulcus bleeding index were recorded at baseline and at 4 weeks.

Next, a sealed bag was randomly given to the patient. They were taken to a different room that the researcher could not see. Without using a mirror, the students were instructed to brush for precisely one minute using that toothbrush and a pea-sized amount of the provided Colgate Total Toothpaste. They were instructed to place the brush in the bag and head straight back to the researcher's room for a retest of the plaque score after one minute had passed. Following the recording of the second score, the researcher was informed of the toothbrush type, which was also noted.

Questionnaire was filled at the end of 4 weeks.

Turesky's modification of the Quigely–Hein PI[9]

0	No Plaque
1	Separate flecks of plaque at the cervical margin
2	A thin continuous band of plaque upto 1mm at the cervical margin.
3	Band wider then 1mm but less than 1/3rd of the crown of the tooth.
4	Plaque covering atleast 1/3rd but less than 2/3rd of the crown of the tooth.
5	Plaque covering 2/3rd or more of the crown of the tooth.

The data was tabulated and analysed using a two-tailed T-test on Microsoft Excel; to establish if there was any significant difference in the performance of the two toothbrushes at both sites.

Results

Table 1: Comparison of Plaque index at baseline and at 4weeks interval

	Plaque index	
	Baseline	At 4 weeks
TB- 1	1.83	1.79
TB- 2	1.86	1.83

P value < 0.05

Table 2: Comparison of Gingival bleeding index at baseline and at 4weeks interval

	Modified sulcus bleeding index	
	Baseline	At 4 weeks
TB- 1	1.36	1.31
TB- 2	1.39	1.37

P value < 0.05

The null hypothesis was that there should be no significant difference between the change in plaque score with Toothbrush 1 (TB1= Bamboo Toothbrush) and Toothbrush 2 (TB2 =Plastic Toothbrush) at either site.

Sn.	Questions	TB-1		TB-2	
		Yes	No	Yes	No
1	Do you use brush to clean your teeth twice daily?	29	11	33	07
2	Do you have practice of using any interdental aid?	29	11	26	14
3	Do you know plastic toothbrushes are difficult to decompose?	31	09	35	05
4	Did you experience any bleeding from gums while brushing prior to this study?	16	24	17	23
5	Were you comfortable in using toothbrush allotted to you?	37	03	38	02
6	Was the lodged food removed after brushing with toothbrush allotted to you?	38	02	36	04
7	Were you able to incorporate the Modified Bass brushing technique demonstration given to you?	39	01	38	02
8	Were you able to clean backmost teeth using the toothbrush allotted to you?	40	00	36	04
9	Did you notice any bleeding from gums after using toothbrush allotted to you?	01	39	03	37
10	Was the toothbrush allotted to you sustainable?	40	00	00	40
11	According to you, are bamboo toothbrushes economical to use?	30	10	31	09

12	Are bamboo toothbrushes currently available locally in your area?	29	11	25	15
13	Did you feel the need to use another dental aid for better cleaning experience along with the toothbrush?	04	36	04	36
14	Did you find any difference in the bristles of the toothbrush allotted to you?	02	38	00	40
15	Would you prefer bamboo toothbrush over plastic toothbrush to help in reducing plastic waste?	40	00	40	00

Discussion

The toothbrush is both the most efficient and cost-effective method for mechanical plaque control. However, a significant drawback is that it has traditionally been made from plastic, which poses environmental hazards.[10] The objective of this study was to look at two manual toothbrushes and determine if a new-to market bamboo toothbrush was as effective as a current established plastic toothbrush at plaque removal. Often called a "bamboo toothbrush," the "Bogobrush" is a biodegradable wooden toothbrush. It may be disposed of in an environmentally acceptable way without harming the environment, unlike plastic toothbrushes. These toothbrushes' primary goal is to be environmentally friendly. They come in a variety of designs, such as folding ones and ones with plant seeds inserted in the handle that sprout into a plant when buried.[11] According to Duane et al., every year, over 2.5 million kg of CO2 emissions are produced during the manual plastic toothbrush production process.[12] In this study, two types of toothbrushes were used: plastic, bamboo. The study compared the patient's satisfaction these two toothbrushes in removing plaque. All participants were briefed about the study, and they signed a consent form. Before starting the trial, all participants received education on oral hygiene, and proper brushing techniques were demonstrated. Participants were given the same brand of toothpaste and instructed in the same brushing technique.

The plaque score was assessed at the start of the study, and at the 4-month follow-up. The Modified Quigley & Hein scale used had the generated discrete data rather than continuous.

Natural bamboo that has been dried, shaped, and then bristled is used to make bamboo toothbrushes. A variety of oil-based hydrocarbon polymers are used to make plastic toothbrushes. Recently, there has been a surge in demand for bamboo items due to a global rise in the desire to use more sustainably produced food and less fossil fuels. In this study, bamboo toothbrushes were found to be the most effective, followed by plastic toothbrushes. Pilcher et al. in Gujarat conducted a similar study and concluded that bamboo toothbrushes are considered a more sustainable alternative to plastic toothbrushes.[13] Mistry concluded that a bamboo toothbrush can clean teeth as effectively as a plastic toothbrush.[14] Bamboo toothbrush used in the study will achieve 95% reduction in non-biodegradable component of toothbrush. Lazarescu et al in their study have stated that patient compliance is of paramount importance and plays a vital role in mechanical plaque control methods. Encouragement of patients on a repetitive basis with tailor made instructions, and demonstrating brushing technique to them help retain information better regarding the brushing technique. Patients' satisfaction with their assigned toothbrushes was recorded through a questionnaire they were asked to complete. 93% of participants of TB-1 group were comfortable to use

Bamboo toothbrush whereas 98% participants in TB-1 group did not notice any difference in the bristles. Gingival bleeding seen in participants using plastic tooth brush was more as compare to participants using bamboo tooth brush. Breintenmoser stated that manual toothbrushes with cut filaments resulted in greater gingival lesions or gingival bleeding than end rounded filaments.[15] In a study conducted by Bhimani et al, they reported contradictory results to our study regarding bleeding gums while brushing. They stated that 85.96% study participants did not experience any bleeding while brushing their teeth with the toothbrush given to them.[16]

A manual toothbrush should be changed every three to four months, according to the Centers for Disease Control and Prevention (CDC). If you use it for longer than this, the bristles may get worn out and frayed, which may lessen how well they remove plaque. Natural toothbrushes have the same plaque-removal power as conventional ones, and they also have biodegradable and environmentally beneficial qualities. They combine good dental hygiene with environmental responsibility, making them a sustainable substitute for plastic toothbrushes.

A move towards fully natural and biodegradable bristle is virtuous, but not currently feasible. The rounded profile of these filaments combined with the inability to withstand vigorous wet/dry/friction forces associated with brushing teeth, means that they are not able to perform consistently over a typical 3-month life span that one would expect. (That is approximately twice a day x 90 days x 2 minutes = 6 hours of use). Further research should be done to assess the long term performance of these toothbrushes and other biodegradable oral health products.

Conclusion

Natural toothbrushes are biodegradable and environmentally friendly, and they remove plaque just as well as traditional toothbrushes. Plastic toothbrushes can be replaced with natural toothbrushes. The results of this study provide some light on how satisfied users are using bamboo toothbrushes. The authors advise conducting additional research on populations with intermediate or advanced dental conditions to assess the toothbrush's effectiveness and on populations with restricted mobility to assess the manual dexterity of these patient.[17]

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