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SHORT COMMUNICATION

# Evaluation of the preference and recommendation of dentists regarding the use of bamboo toothbrushes

# Evaluación de la preferencia y recomendación de odontólogos respecto al uso de cepillos de bambú

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**ABSTRACT**

The present study evaluated the knowledge, use, and perception of bamboo brushes among 35 health professionals. Although 97,1 % are aware of these brushes, only 22,9 % use them, indicating a significant gap between knowledge and adoption. Some 67,7 % of the respondents showed interest in trying them, but only 35,3 % recommend them, influenced by the perception of their effectiveness. In addition, 80 % know that plastic toothbrushes take more than 70 years to disintegrate, but 91,2 % have never received information on how to properly recycle a toothbrush, highlighting the need for sustainability education. Despite the willingness of 60 % to switch to bamboo brushes, the lack of information and education on recycling remains an obstacle. The study concludes that the adoption of sustainable practices requires increased awareness and education on recycling and plastic waste management.

**Keywords:** Oral Hygiene; Dentists; Health Personnel; Prevention; Bamboo Brush.

**RESUMEN**

El presente estudio evaluó el conocimiento, uso y percepción de los cepillos de bambú entre 35 profesionales de la salud. Aunque el 97,1 % conoce estos cepillos, solo el 22,9 % los utiliza, indicando una brecha significativa entre el conocimiento y la adopción. Un 67,7 % de los encuestados mostró interés en probarlos, pero solo el 35,3 % los recomienda, influenciado por la percepción de su efectividad. Además, el 80 % sabe que los cepillos de plástico tardan más de 70 años en desintegrarse, pero el 91,2 % nunca ha recibido información sobre cómo reciclar correctamente un cepillo, lo que resalta la necesidad de educación en sostenibilidad. A pesar de la disposición del 60 % a cambiar a cepillos de bambú, la falta de información y educación sobre el reciclaje sigue siendo un obstáculo. El estudio concluye que la adopción de prácticas sostenibles requiere una mayor sensibilización y educación en reciclaje y manejo de residuos plásticos.

**Palabras clave:** Higiene Bucal, Odontólogos, Personal de Salud, Prevención, Cepillo de Bambú.

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## INTRODUCTION

Oral hygiene is one of the fundamental pillars in promoting health and the general well-being of the population. Proper oral health maintenance prevents the onset of diseases such as caries and periodontal disease and plays a crucial role in people's quality of life.[1,2] Among the most widespread practices for plaque control, the toothbrush has become the most widely used and effective tool due to its accessibility, simplicity, and effectiveness in oral cleaning. However, despite these benefits, the plastic composition of traditional toothbrushes has generated growing concerns about their environmental impact due to the accumulation of plastic debris that seriously affects ecosystems, especially marine ecosystems.[3,4]

Since the invention of the nylon-bristled toothbrush in the 20th century, its production has been dominated by plastics, such as polypropylene for the handle and nylon for the bristles. These materials, while effective for their intended purpose in oral hygiene, have serious disadvantages from an environmental point of view.[5] Plastic toothbrushes, like other everyday products made from plastic, are virtually non-biodegradable, meaning they can remain in the environment for hundreds of years before decomposing completely.[6] This long degradation time has contributed to the massive accumulation of plastics in landfills and, more worryingly, in the oceans, forming vast garbage islands that threaten marine life and ecological balance.[7,8,9]

The problem of plastic pollution has reached alarming proportions. Recent studies have revealed the presence of plastics, microplastics, and nanoplastics in every corner of the planet, from the most remote beaches to the deepest ocean abysses. These plastic fragments disrupt ecosystems and enter the food chain, affecting a wide range of species, including those that form part of the human diet. The adverse effects of plastics on aquatic organisms include entanglement, accidental ingestion, and toxicity, which have resulted in a significant increase in the mortality of marine species, including birds, fish, turtles, and marine mammals.[10,11,12]

Given this scenario, the search for more sustainable alternatives has become imperative. In recent years, bamboo toothbrushes have gained popularity as an environmentally friendly and responsible option for oral hygiene. Bamboo, a plant known for its rapid growth and sustainability, is a completely biodegradable material, making it a viable alternative to plastic. In addition, bamboo possesses natural antibacterial properties, which reduces the need for pesticides or fertilizers in its cultivation, thus contributing to cleaner and less environmentally damaging production.[2,13,14,15]

The objective of this research is to evaluate the viability of the bamboo toothbrush as a substitute for the traditional plastic toothbrush, considering the degree of knowledge and acceptance of dental professionals regarding bamboo toothbrushes. Likewise, dentists' perceptions of the sustainability and ecological advantages of bamboo toothbrushes will be explored, and the level of willingness of these professionals to recommend their use among patients will be identified.

The aim of this research is not only to contribute to scientific knowledge about sustainable oral hygiene options but also to promote a change in daily practices towards more environmentally responsible alternatives. The adoption of bamboo toothbrushes could represent a significant step towards reducing plastic pollution, helping to preserve marine and terrestrial ecosystems, and improving the quality of life in our society by integrating personal hygiene practices with an environmental sustainability approach.

## METHOD

A study with statistical analysis was carried out using a survey of 35 health professionals of both sexes, including all the specialties of the career of Dentistry at the Universidad Abierta Interamericana in 2024, to evaluate the degree of recommendation of bamboo toothbrushes, the knowledge of the different alternatives that can be found in the market to replace plastic toothbrushes and to provide information. The survey is based on a published work by López López et al.[16]

The mode of analysis used was based on data and models obtained from a research work published in Scielo, which WhatsApp will send. The following aspects will be considered: "knowledge about bamboo brushes," "use them," "would like to try them," "where do you throw the brush," "would recommend them," "brand do you recommend," etc.

To assess the degree of recommendation dentists have about bamboo toothbrushes, 11 closed-ended questions were asked. There were 11 closed questions with "yes" and "no" options and three questions for them to complete with their ideas.

After answering the survey, the necessary basic information on the contamination of the toothbrushes and the existing forms of recycling that are necessary to avoid contaminating the environment was provided through a brochure.

In this study, the protection and confidentiality of the data provided by the respondents was guaranteed. Rigorous security measures were implemented to safeguard personal information, ensuring the data were treated anonymously and used exclusively for research purposes. Likewise, informed consent was obtained from each participant, complying with the ethical regulations established for collecting and handling data in academic research.

## RESULTS AND DISCUSSION

The results obtained in this study reveal an interesting trend regarding the knowledge and use of bamboo brushes among health professionals.

The results obtained in this study show significant patterns in the knowledge and use of bamboo brushes among health professionals. A large 97,1 % of the respondents are familiar with these brushes, suggesting a considerable product diffusion among this professional group. However, only 22,9 % of the participants have incorporated bamboo brushes into their daily routine, evidencing a notable gap between product awareness and practical adoption.

Regarding willingness to try bamboo brushes, 67,7 % of respondents expressed interest, which could reflect an openness to more sustainable options. Despite this, only 35,3 % of the professionals recommend their use, which could influence their perception of effectiveness; 62,9 % consider bamboo brushes effective, although only 14,3 % noted significant differences compared to conventional brushes.

**Table 1.** Responses to survey questions on bamboo brush use

| Questions | | Yes | % | No | % |
|---|---|---|---|---|---|
| 1 | Knowledge about bamboo brushes | 34 | 97,1 | 1 | 2,9 |
| 2 | Use of bamboo brushes | 8 | 22,9 | 27 | 77,1 |
| 3 | Interest in trying bamboo brushes | 23 | 67,7 | 7 | 19,4 |
| 4 | Recommendation of bamboo brushes | 12 | 35,3 | 5 | 14,7 |
| 5 | Perception of effectiveness of bamboo brushes | 22 | 62,9 | 4 | 11,4 |
| 6 | Differences noted with the use of bamboo brushes | 5 | 14,3 | 17 | 48,6 |
| 7 | Knowledge about plastic brush disintegration | 28 | 80,0 | 7 | 20,0 |
| 8 | Place where the toothbrush is thrown away | 30 | 85,7 | 5 | 14,3 |
| 9 | Knowledge about plastic toothbrush contamination | 22 | 62,9 | 13 | 37,1 |
| 10 | Interest in changing the plastic toothbrush for a bamboo toothbrush | 21 | 60,0 | 9 | 25,7 |
| 11 | Information on how to recycle the toothbrush | 3 | 8,8 | 32 | 91,2 |

Awareness of the environmental impact of plastic brushes is considerably high, with 80 % of professionals aware that these products take more than 70 years to decompose. However, 37,1 % of respondents were unaware that plastic brushes can pollute if not disposed of correctly, highlighting the need for further education about plastic waste management.

In addition, although 60 % of respondents would be willing to exchange their plastic brush for a bamboo one, there is still a lack of information on the correct recycling of these products, with 91,2 % of professionals having never received guidance on the subject. This finding highlights the importance of developing and implementing educational programs that promote sustainable practices at the individual level and in the professional environment.

The use of plastics in disposable products, such as toothbrushes, has generated a significant environmental problem. Plastics, being non-biodegradable, decompose into microplastics and nanoplastics that persist in the environment and seriously affect aquatic ecosystems. The COVID-19 health crisis has exacerbated this situation, increasing plastic debris that affects both human health and the environment.[10,11]

Bamboo brushes offer a more sustainable alternative. These brushes are compostable, and although they require the removal of non-biodegradable bristles, their environmental impact is significantly less than plastic brushes. Despite the environmental advantages and growing awareness of sustainability, the adoption of bamboo brushes remains limited, in part due to a lack of information and education on their use and recycling.[17,18,19]

Although healthcare professionals show a high level of knowledge about bamboo brushes and the problems associated with plastic, the transition to more sustainable practices requires further education and awareness, especially regarding recycling and proper handling of plastic waste. Implementing educational programs could facilitate a broader and more effective shift towards using sustainable products, such as bamboo brushes.

## CONCLUSIONS

High awareness but low adoption: Although 97,1 % of health professionals surveyed are familiar with bamboo toothbrushes, only 22,9 % use them, evidencing a significant gap between product awareness and implementation in daily practice.

Lack of information on recycling: There is a significant lack of information on properly recycling toothbrushes, with 91,2 % of respondents having never received guidance on properly recycling these products, highlighting the need for more robust educational programs in this area.

Interest in sustainable alternatives: Despite current low adoption, 60 % of respondents show a willingness to exchange their plastic toothbrush for a bamboo one, indicating an openness to more sustainable practices, especially if the lack of information is adequately addressed and perceptions of the effectiveness of these products are improved.

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## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

## AUTHORSHIP CONTRIBUTION

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## BIBLIOGRAPHIC REFERENCES

1. Khan SA, Syed FA, Khalid T, Farheen N, Javed F, Kazmi SMR. An updated systematic review on toothbrush contamination: An overlooked oral health concern among general population. Int J Dent Hyg 2024;22:95-105. https://doi.org/10.1111/idh.12740.

2. Kariya PB, Desai A, Singh S, Bansal B, Shah Y. Comparing plaque removal efficacy of biodegradable toothbrush and nonbiodegradable toothbrush in children of 8-10 years of age: A randomized clinical study. J Indian Soc Pedod Prev Dent 2024;42:112-8. https://doi.org/10.4103/jisppd.jisppd_61_24.

3. Godbole N, Tirupathi SP, Nair S, Afnan L, Nallapu A, Nallapu A. Effectiveness of picture-based interventions of toothbrush training on improvement of oral hygiene in children with autism spectrum disorders: A systematic review and meta-analysis. Spec Care Dent Off Publ Am Assoc Hosp Dent Acad Dent Handicap Am Soc Geriatr Dent 2024;44:686-99. https://doi.org/10.1111/scd.12950.

4. Oliveira LM, Pazinatto J, Zanatta FB. Are oral hygiene instructions with aid of plaque-disclosing methods effective in improving self-performed dental plaque control? A systematic review of randomized controlled trials. Int J Dent Hyg 2021;19:239-54. https://doi.org/10.1111/idh.12491.

5. Sahile AT, Wondimu MT, Fikrie EM. Tooth brushing practice in Ethiopia: a systematic review and meta-analysis. Sci Rep 2023;13:6418. https://doi.org/10.1038/s41598-023-33541-0.

6. Oudkerk J, Grenade C, Davarpanah A, Vanheusden A, Vandenput S, Mainjot AK. Risk factors of tooth wear in permanent dentition: A scoping review. J Oral Rehabil 2023;50:1110-65. https://doi.org/10.1111/joor.13489.

7. Maryani N, Octavia A, Budiyantoro C, Ulfa M. Prevention of Pneumonia due to Ventilator in Critical Patients with U Shape Oral Hygiene Model: A Systematic Review. Romanian J Anaesth Intensive Care 2023;30:1-9. https://doi.org/10.2478/rjaic-2023-0001.

8. Zhao T, Wu X, Zhang Q, Li C, Worthington HV, Hua F. Oral hygiene care for critically ill patients to prevent ventilator-associated pneumonia. Cochrane Database Syst Rev 2020;12:CD008367. https://doi.org/10.1002/14651858.CD008367.pub4.

9. Rajwani AR, Hawes SND, To A, Quaranta A, Rincon Aguilar JC. Effectiveness of Manual Toothbrushing Techniques on Plaque and Gingivitis: A Systematic Review. Oral Health Prev Dent 2020;18:843-54. https://doi.org/10.3290/j.ohpd.a45354.

10. Castañeta G, Gutiérrez AF, Nacaratte F, Manzano CA. Microplásticos: un contaminante que crece en todas las esferas ambientales, sus características y posibles riesgos para la salud pública por exposición. Rev Boliv Quím 2020;37.

11. Godoy-Balcarcel B, Ponciano-Nuñez M, Alpuche-Palma A, Vera- Quiñones F, Mendiola-Campuzano J. Identificación de microplástico en el contenido gastrointestinal de peces comerciales. Rev Iberoam Cienc 2021;8:124-34.

12. López-Marcano JJ, García Marcano EA, Marina Fermín I. Microplásticos en la sardina Sardinella aurita (Teleostei: Clupeidae) en Sucre, Venezuela. Rev Biol Trop Internet 2023;71.

13. Lyne A, Ashley P, Saget S, Porto Costa M, Underwood B, Duane B. Combining evidence-based healthcare with environmental sustainability: using the toothbrush as a model. Br Dent J 2020;229:303-9. https://doi.org/10.1038/s41415-020-1981-0.

14. Halton C, Duane B, Batey AC, Wong J, Corley A, Hart F, et al. How much do consumers consider sustainability when purchasing a toothbrush? A discrete choice experiment. Br Dent J 2022;233:327-32. https://doi.org/10.1038/s41415-022-4914-2.

15. Kim JH, Lee JG, Han DH, Kim HJ. Morphometric analysis of the anterior region of the maxillary bone for immediate implant placement using micro-CT. Clin Anat 2011;May;24(4):462-8.

16. López López J, Terrades Oliver M, Rodríguez Poblador F, Roselló Llabrés X, Enrie Salas J, Chimenos Küstner E. Encuesta de satisfacción a los pacientes que acuden al servicio de primeras visitas y de Integrada de Adultos de la Clínica Odontológica Universitaria de la Facultad de Odontología de la Universitat de Barcelona. Av Odontoestomatol 2002;18.

17. Cancino V. Evaluación de la preferencia y recomendación de odontólogos respecto al uso de cepillos de bambú. Tesis para optar por el título de Odontólogo. Universidad Abierta Interamericana, 2024.

18. Gestor. Cepillo de dientes ecológico de bambú ¿Es una buena opción? Álvaro Fr Clínica Dent 2020. https://www.alvaroyfrancodental.com/odontologia-general/cepillo-de-.

19. Gtresonline. ¿Son realmente recomendables los cepillos de dientes de bambú? Hola.com 2019. https://www.hola.com/estar-.