



## ELECTRIC TOOTHBRUSH VERSUS MANUAL TOOTHBRUSH: WHICH IS MORE EFFECTIVE AT REMOVING PLAQUE?

ESCOVA DE DENTES ELÉTRICA VS. ESCOVA DE DENTES MANUAL: QUAL É  
MAIS EFICAZ NA REMOÇÃO DE PLACA BACTERIANA?

CEPILLO DE DIENTES ELÉCTRICO VS. CEPILLO DE DIENTES MANUAL: ¿CUÁL  
ES MÁS EFICAZ PARA ELIMINAR LA PLACA?

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## ABSTRACT

**Objective:** The objective of this narrative review article is to address the traditional and electric toothbrushes, aiming to identify which is more effective in removing bacterial plaque. **Methodology:** This article is a narrative literature review, for this reason, it was necessary to use a study that explains how a narrative review is done, what its approach is, what things need to be included in the article and what characteristics need to be present, thus, the study by Rother (2007) was the study selected to serve as a guide during the creation of this narrative review. In addition, to acquire the maximum amount of rich and scientifically based information, current articles and research, doctoral and master's theses were used, aiming to bring the maximum amount of content related to the topic addressed. **Results:** Both the traditional and electric toothbrushes demonstrated similar efficacy in removing bacterial plaque, with performance dependent on correct use and user individualities. **Conclusion:** Based on the analysis of the information obtained, it was seen that both traditional and electric toothbrushes are effective in removing plaque. In fact, correct use in conjunction with specific movements are factors that will result in good plaque removal or not. In addition, it was concluded that the type of toothbrush should be used depending on the user and their limitations, and that a dentist must indicate which is the best option in each case.

**Keywords:** Oral Hygiene. Dental and Oral Hygiene Products. Dental Plaque. Dentistry.

## RESUMO

**Objetivo:** O objetivo deste artigo de revisão narrativa é abordar as escovas dentais tradicionais e elétricas, visando identificar qual é mais eficaz na remoção de placa bacteriana. **Metodologia:** Este artigo é uma revisão narrativa da literatura, por este motivo, foi necessário utilizar um estudo que explicasse como é feita uma revisão narrativa, qual sua abordagem, o que precisa constar no artigo e quais características precisam estar presentes, assim, o estudo de Rother (2007) foi o estudo selecionado para servir de guia durante a criação desta revisão narrativa. Além disso, para adquirir o máximo de informações ricas e embasadas cientificamente, foram utilizados artigos e pesquisas atuais, teses de doutorado e mestrado, visando trazer o máximo de conteúdo relacionado ao tema abordado. **Resultados:** Tanto as escovas dentais tradicionais quanto as elétricas demonstraram eficácia semelhante na remoção de placa bacteriana, com desempenho dependente do uso correto e individualidades do usuário. **Conclusão:** Com base na análise das informações obtidas, foi visto que tanto as escovas dentais tradicionais quanto as elétricas são eficazes na remoção de placa. De fato, o uso correto em conjunto com movimentos específicos são fatores que resultarão em uma boa remoção de placa ou não. Além disso, concluiu-se que o tipo de escova de dentes deve ser utilizado dependendo do usuário e de suas limitações, e que o dentista deve indicar qual a melhor opção em cada caso.

**Palavras-chave:** Higiene Bucal. Produtos para Higiene Dental e Bucal. Placa Dentária. Odontologia.

## RESUMEN

**Objetivo:** El objetivo de este artículo de revisión narrativa es abordar los cepillos de dientes tradicionales y eléctricos, con el objetivo de identificar cuál es más eficaz en la eliminación de la placa bacteriana. **Metodología:** Este artículo es una revisión narrativa de la literatura, por esta

razón, fue necesario utilizar un estudio que explique cómo se realiza una revisión narrativa, cuál es su enfoque, qué cosas deben incluirse en el artículo y qué características deben estar presentes, por lo tanto, el estudio de Rother (2007) fue el estudio seleccionado para servir como guía durante la creación de esta revisión narrativa. Además, para adquirir la máxima cantidad de información rica y con base científica, se utilizaron artículos e investigaciones actuales, tesis de doctorado y maestría, con el objetivo de traer la máxima cantidad de contenido relacionado con el tema abordado. Resultados: Tanto los cepillos de dientes tradicionales como los eléctricos demostraron una eficacia similar en la eliminación de la placa bacteriana, con un rendimiento que depende del uso correcto y de las individualidades del usuario. Conclusión: Con base en el análisis de la información obtenida, se vio que tanto los cepillos de dientes tradicionales como los eléctricos son eficaces en la eliminación de la placa. De hecho, el uso correcto junto con movimientos específicos son factores que resultarán en una buena eliminación de la placa o no. Además, se concluyó que el tipo de cepillo de dientes debe utilizarse en función del usuario y sus limitaciones, y que es el odontólogo quien debe indicar cuál es la mejor opción en cada caso.

**Palabras clave:** Higiene Bucal. Productos de higiene bucal y Dental. Placa Dental. Odontología.



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## INTRODUCTION

As humanity develops, more technologies and inventions emerge with the aim of improving, facilitating and helping human beings in the vast majority of cases, which can be seen in the area of health, with the improvement of dentistry and medicine. In dentistry, concern for oral hygiene has always been and continues to be a discussed subject and over the years it has received innovations that elevate and improve the health of society. According to manuscripts found in Babylon in 3,500 BC, the society of the time used gold toothpicks to clean their teeth, while in Egyptian tombs, reports were found indicating that the Egyptians used twigs to perform their oral hygiene, performing friction movements on the surfaces of the teeth in order to remove food debris (Maccauley, 1946).

Over the years, other types of brushes were developed, such as those that used vulture feather bristles, porcupine bristles, pig hair, horse tails, roots and herbs from nature (Garfin, 1964; Andrade *et al.*, 1991; Maccauley, 1946) until we reached the brushes we use today that use nylon bristles combined with plastic handles. Toothbrushes have been undergoing increasingly more evolutions, with the aim of increasingly meeting the needs of their users, improving not only their design but mainly their effectiveness in removing bacterial plaque in all regions of the mouth,

including the gingival margins and interproximal regions of the teeth, which are commonly seen as difficult-to-access places for cleaning (Ribeiro, 2020). Thus, with these objectives in mind, large industries began to produce the famous electric toothbrushes, which came with a proposal to facilitate not only the removal of bacterial plaque but also to be an alternative option to the manual toothbrush for people with manual difficulties, nervous system problems or even for children who do not adapt to the manual toothbrush, with the electric toothbrush being an option seen by many as a brush that removes more bacterial plaque than the manual one due to its innovative and facilitating technology (van der Weijden & Slot, 2015; Yaacob *et al.*, 2014; van der Sluijs *et al.*, 2016; Glenny *et al.*, 2011; Slot *et al.*, 2012).

Thus, the objective of this narrative review article is to address the traditional and electric toothbrushes, aiming to identify which is more effective in removing bacterial plaque.

## **2 METHODOLOGY**

This article is a narrative literature review, for this reason, it was necessary to use a study that explains how a narrative review is done, what its approach is, what things need to be included in the article and what characteristics need to be present, thus, the study by Rother (2007) was the study selected to serve as a guide during the creation of this narrative review. In addition, in order to acquire the maximum amount of rich and scientifically based information, current articles and research, doctoral and master's theses were used, aiming to bring the maximum amount of content related to the topic addressed. Gray literature was also a key point used in the development of this narrative review, bringing relevant and important information. In order to search for information to compose the work, the following databases were used: Scielo, BVS/BIREME, Web of Science, The Cochrane Library, PROSPERO, PUBMED Central.

## **3 RESULTS**

The study by Adam *et al.* (2020) was a randomized crossover clinical trial in which the potential for removing bacterial plaque between a manual and an electric toothbrush was evaluated, aiming to identify which is more effective, where the research participants (27) were instructed not to perform oral hygiene 12 hours before the study evaluation, which had four evaluation periods. The amount of bacterial plaque was evaluated before and after brushing,

where all the research participants brushed twice with the manual toothbrush and twice with the electric toothbrush, accompanied by a toothpaste. After analyzing the results, it was possible to see that the electric toothbrush was statistically superior to the manual toothbrush in removing bacterial plaque.

The work of Delgado *et al.* (2017) is a systematic review that aimed to evaluate and compare the use of manual and electric toothbrushes in the removal of bacterial plaque and other oral health problems, where 56 clinical trials were analyzed. This study found that electric toothbrushes are more effective in removing bacterial plaque than manual toothbrushes, both in the short and long term of use, evidencing the superiority of the electric toothbrush when compared to the manual one.

The study conducted by Costa *et al.* (2001) involved 29 children, 14 with mixed dentition and 15 with primary dentition, and the objective was to compare the removal of bacterial plaque between manual and electric toothbrushes and which one was more effective in controlling the amount of plaque. After the study, it was concluded that in children with mixed dentition, both toothbrushes were effective in removing bacterial plaque, with neither demonstrating superiority over the other. However, children with primary dentition had a difference in results, in which the electric toothbrush was more effective in removing bacterial plaque, especially in areas that were difficult to access, such as the lingual surfaces of the teeth.

The study by Barros *et al.* (2001) in this work the authors aimed to carry out a historical look at the trajectories of oral hygiene and the evolution of toothbrushes, bringing out the positive points of each one. After analyzing and discussing each type of toothbrush, the study pointed out that electric toothbrushes are mainly indicated for people with motor difficulties, elderly patients or those with special needs. In addition, the electric toothbrush presented itself as a brush that has greater effectiveness in removing bacterial plaque when compared to traditional manual toothbrushes.

Grilo's (2022) study was a systematic review that aimed to group all existing information in the literature that analyzes which brush is more effective in removing bacterial plaque between the electric and manual brushes. After analyzing all the information acquired by the author, he concluded that the electric brush is better at removing bacterial plaque in children with mixed and deciduous dentition when compared to the manual brush, regardless of who performs the brushing. In addition, another aspect addressed was in relation to the long-term use of the electric brush, which showed that over time, it loses part of its effectiveness in removing bacterial plaque.

However, even though the brush loses its effectiveness over the course of its use, the electric brush still remains superior to the manual brush.

The study carried out by Ribeiro (2024) aimed to compare the removal of bacterial plaque between the electric and manual toothbrushes, aiming to identify which of the two is more effective in removing plaque between two brushing moments. During the study, the result was an average removal of 46.76% of bacterial plaque with the use of the electric toothbrush and 41.32% using the manual toothbrush, while in the second brushing, an average removal of 42.74% using the electric toothbrush and 41.29% with the manual toothbrush, that is, demonstrating that the electric toothbrush had a greater removal of bacterial plaque. However, the study stated in its conclusion that the electric toothbrush did not demonstrate superiority over the manual toothbrush, as it had a very close variation between the percentages of plaque removal.

Marmelo's study (2016) conducted a literature review that aimed to systematically review the techniques and methods of plaque control for the prevention of peri-implant diseases. After conducting the study, it was concluded that electric, manual or supersonic toothbrushes have the same potential for plaque control, without one being superior to the other. However, the study also stated that this is still a fact discussed in the literature, as some authors state that the electric toothbrush is superior to the others and others state that the manual and electric toothbrushes have the same effectiveness in removing plaque.

Nobre (2009) conducted a longitudinal, randomized, and blind study that aimed to verify the effectiveness of manual and electric toothbrushes in removing plaque in the elderly, where 30 elderly people used the manual toothbrush and another 30 used the electric toothbrush, aiming to identify which group had greater plaque removal and better oral health and hygiene. After the study, the following results were obtained: the electric toothbrush removed 50.24% on the seventh day of use and 55.83% on the fifteenth day, while the manual toothbrush removed 36.64% on the seventh day of use and 49.52% on the fifteenth day of use. Thus, the study concluded that although the electric toothbrush removes more plaque than the manual toothbrush, these results were not statistically significant, highlighting the need for further studies addressing this topic.

Yaacob *et al.* (2014) conducted a study in which the plaque removal potential of manual and electric toothbrushes was analyzed, aiming to identify which is more effective. After conducting the study, the authors stated that, in the long term and in the short term, the electric toothbrush is more effective in removing plaque and controlling gingivitis.

The study by Hogan *et al.* (2007) was a clinical trial that sought to identify whether the

electric and manual toothbrushes would have the same effectiveness in removing bacterial plaque even after months of using the brush, concluding that there was no statistically relevant change in relation to the removal of bacterial plaque, showing that both, even after a certain period of use, continue to perform equal biofilm removal control.

#### 4 DISCUSSION

The results obtained from the studies analyzed in this review provide a comprehensive understanding of the effectiveness of traditional and electric toothbrushes in removing bacterial plaque. One of the primary findings is that both types of toothbrushes demonstrate efficacy in plaque removal when used correctly, yet certain contexts reveal the electric toothbrush as having a marginal advantage.

The study by Adam *et al.* (2020) highlights the statistically significant superiority of the electric toothbrush in removing plaque compared to manual toothbrushes. This finding aligns with the systematic review by Delgado *et al.* (2017), which found consistent evidence supporting the superior performance of electric toothbrushes in both short-term and long-term plaque control. These studies suggest that the advanced technology incorporated into electric toothbrushes, such as oscillating or sonic movements, enhances their ability to clean dental surfaces effectively, particularly in hard-to-reach areas. In contrast, some studies, such as Costa *et al.* (2001) and Ribeiro (2024), demonstrate more nuanced outcomes. While electric toothbrushes showed better plaque removal in children with primary dentition and specific circumstances, the differences between the two types of brushes were not always statistically significant. This finding emphasizes the critical role of user technique in achieving effective oral hygiene, regardless of the toothbrush type.

Barros *et al.* (2001) and Hogan *et al.* (2007) also add valuable insights by focusing on the practical applications of each toothbrush type. Barros *et al.* point out the importance of electric toothbrushes for individuals with motor limitations or special needs, reinforcing their role as an adaptive tool for specific populations. Hogan *et al.*'s findings, which show comparable plaque removal capabilities of manual and electric toothbrushes even after prolonged use, suggest that the durability and consistency of performance for both types warrant consideration.

Despite the apparent advantages of electric toothbrushes in certain contexts, the findings of Marmelo (2016) and Nobre (2009) underscore the variability in the literature. Marmelo's

review suggests that the overall potential for plaque control does not differ significantly between electric and manual toothbrushes. Similarly, Nobre's study found no statistically significant difference in plaque removal among elderly participants, indicating that user compliance and brushing habits may play a more pivotal role than the toothbrush type itself. Furthermore, the systematic review by Grilo (2022) raises an important consideration about the long-term efficacy of electric toothbrushes. While initially more effective, the decreasing performance over time due to factors such as brush head wear was noted, underscoring the need for regular maintenance and replacement of brush heads to sustain effectiveness.

The analysis of these studies reveals that while electric toothbrushes may offer slight advantages, particularly for individuals with specific needs or limitations, their efficacy is closely tied to proper use and maintenance. On the other hand, manual toothbrushes, when used with appropriate technique and dedication, can achieve comparable results. The importance of individualized recommendations by dental professionals emerges as a critical factor, ensuring that the selected toothbrush type aligns with the user's abilities, preferences, and oral health needs.

## **5 CONCLUSION**

Based on the analysis of the information obtained, it was possible to verify that both traditional and electric toothbrushes are effective in removing plaque. In fact, correct use in conjunction with specific movements are factors that will result in good plaque removal or not. In addition, it was concluded that the type of toothbrush should be used depending on the user and their limitations, and that a dentist should indicate which is the best option in each case. However, the vast majority of studies indicate that the electric toothbrush is still more effective in removing plaque than the manual toothbrush, but it is still clear that more studies need to be carried out on this topic so that we can be more certain about which of the two options is more effective.

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