

## O C

s t M  
 Ó s M  
 q M  
 u t M  
 ñ é Ó M  
 u M  
 s r M  
 z M  
 z M  
 ó M  
 s t M  
 Ó M

Original Article

Oral Health

OPEN ACCESS

## Introduction

The World Health Organization defines oral health as the absence of pain, diseases and disorders that affect the oral cavity and prevent optimal functioning.<sup>1</sup> Dental plaque is a determining etiological factor of dental caries and periodontal diseases, plaque control is essential for dental and periodontal health, to achieve this it is important to use the toothbrush correctly<sup>2,3</sup> therefore, the elimination of bacterial plaque is the main objective of the various existing techniques<sup>4</sup> with the common goal of reducing the biofilm that is related to the presence of gingivitis. Effective toothbrushing depends on several factors, including motivation, knowledge of technique, and manual dexterity,<sup>5</sup> periodontal diseases can be prevented and cover a wide spectrum of conditions, some are related to bacterial plaque biofilm while others appear not to be influenced by biofilm.<sup>6</sup>

There are epidemiological studies that show a significant association between the severity of periodontal diseases, the amount of dental plaque and the degree of oral hygiene, with a cause-effect relationship between the formation and accumulation of dental plaque and the development of dental plaque. gingivitis. Studies have been carried out with the Løe

**ABSTRACT: Introduction:** Oral diseases affect people throughout their lives, mainly causing pain, discomfort, disfigurement and sometimes death. The electric toothbrush is an easy-to-use and favorable alternative for patients with gingivitis.

**Methods:** Fifteen male and female subjects with gingivitis were instructed to use powered toothbrushes. Three scales were evaluated for the degree of gingivitis and dental plaque. Initial and final evaluations were compared. Collected data were analyzed and were compared using Student's t-test.

**Results:** Simplified Oral Hygiene Index (IHOS), in the first evaluation a mean of 3.56, median of 3.6 and variance of .798 was obtained, in the second evaluation a mean of .46, median of .40, variance of .05, p.000 was observed. Løe and Silness Gingival Index (GIF), in the first evaluation a mean of 2.3, median of 2.2 and variance of .288 was obtained. In the second evaluation, a mean of .03, median of .00, variance of .002, p.000 was observed.

O'Leary index (O'L), in the first evaluation, an average of 97.27% was obtained, median of 98%. In the second evaluation, a mean of 29.67%, median of 30%, p.000 was observed.

**Conclusion:** In this study we found that there is a statistically significant difference in the reduction of dental plaque and gingivitis when using powered toothbrushes.

**Keywords:**

Gingivitis, powered toothbrushes, brushing technique, oral hygiene, periodontal disease.

index that have shown a significant association between the accumulation of bacterial plaque and gingivitis, gingivitis usually disappears when oral hygiene and plaque control methods are restarted,<sup>7</sup> dental plaque is composed of salivary proteins that adhere to the teeth, as well as bacteria and end products of bacterial metabolism. Both cariogenic and periodontal pathogenic bacteria accumulate in plaque located along the gingival margin.<sup>8,9</sup> Clinically, a swollen gingiva is observed, with an elongated gingival contour due to the existence of edema or fibrosis, a red or bluish coloration, a high sulcular temperature, bleeding on probing and an increase in gingival bleeding.<sup>10</sup> Electric toothbrushing is associated with a 46% reduction in plaque after tooth brushing.<sup>11</sup> The objective of this study was to determine if there is a significant difference between washing with an electric brush vs manual technique, in patients with gingivitis.

**Methods**

15 participants aged 20-40 years with a diagnosis of gingivitis were randomly selected, (Table

INCLUSION	EXCLUSION
Patients with an age range of 20 to 40 years, diagnosed with gingivitis (K05).	Patients who are pregnant or taking phenytoin, cyclosporine and nifedipine.
Patients of the CST III-Dr. David Fragoso Lizalde.	Patients with uncontrolled systemic diseases, without treatment.
Patients with at least 20 dental organs.	Edentulous patients or with parafunctional habits such as bruxism.
	Patients who did not attend the second review.
	Patients with chronic tobacco use

**Table 1.** Inclusion and exclusion criteria

1.) they used electric brushes for a period of 4 months, the following indices were compared in the same group: Löe and Silnes Gingival Index (GIF), Simplified Oral Hygiene Index (IHOS) and the O'Leary Index before and after treatment, data collection was performed with Microsoft Office Excel 2021 and statistical analysis was done with the IBM SPSS Statistics V21 program, with the Student's t test for related samples. Once the initial records were obtained, supragingival scaling and prophylaxis were performed on each patient. All patients were instructed in the correct use of the electric brush, the use of dental floss, mouthwashes and any other element that complements oral hygiene were excluded, all were instructed to use their usual toothpaste, brushing twice a day. day (morning and night) according to the recommendation of the American Dental Association (ADA).

## Results

### IHOS Index

Descriptive statistics were performed including mean, median, variance and ranges (**Table 2**). In the first evaluation (with manual brushing) the IHOS index had a mean of 3.56, median of 3.6 and variance of .798, in the second evaluation (with electric brushing) a mean of .46, median of .40, variance of .05. For statistical analysis, the Student's T-test was used for related samples, with a value of p.000.

### GIF Index

In the first evaluation (with manual brushing) the GI index had a mean of 2.3, median of 2.2 and variance of .288. In the second evaluation, mean .03, median .00 and variance .002 was observed. For statistical analysis, the Student's T-test was used for related samples, with a value of p.000.

### O'L Index

In the first evaluation, an average of 97.27% was obtained, median of 98%. In the second evaluation, an average of 29.67%, median of 30%, was observed. For statistical analysis, the Student's T-test was used for related samples, with a value of p.000.

## Discussion

Dental plaque triggers changes in gingival health, resulting in slight swelling and bleeding of the gingival margin.<sup>12</sup> Evolutionarily, the human being has tried to maintain oral hygiene with the use of different devices and techniques, from the use of animal hair, grass, nylon and synthetic fibers, among others. Currently, due to greater knowledge about the pathophysiology of dental plaque formation processes and gingivitis, electrical and ultrasonic devices have been innovated in order to achieve better dental hygiene, especially in areas that are difficult to access with manual brushing. (**Figure 1**). There are studies that ensure that manual brushing is just as effective as



**Figure 1.** **A.** Initial clinical photograph showing edema (arrow), gingival inflammation and bleeding. Spontaneous characteristic sign of gingivitis, fistulous tract with purulent exudate (circle). **B.** Staining with GC Tri Plaque ID Gel is observed, marking the bacterial plaque in three colors: new plate pink, mature plate purple/blue (48hrs) and Blue clear biofilm produced by acid. **C.** Final clinical photograph, after four months of evolution.

electric brushing in reducing dental plaque as well as signs of gingivitis,<sup>13</sup> however, a recent Cochrane systematic review shows greater effectiveness of electric brushing compared to manual brushing, in the significant reduction of dental plaque in the short term,<sup>14</sup> as well as a 2021 clinical trial in a Japanese population where it emphasizes the efficacy of electric brushing in the premolar and molar areas.<sup>15</sup> Ccahuana-Vasquez et al. in the years 2018 and 2019 concluded in their clinical studies, that there is greater efficacy when using an electric toothbrush compared to the standard manual toothbrush, since it significantly reduces gingival inflammation, the number of bleeding sites and dental plaque, providing effective cleaning, which was especially helpful in difficult-to-reach proximal areas.<sup>16, 17</sup> Digell et al. in 2020 found that using electric brushes maintains better oral hygiene than their manual counterparts, having the potential to further reduce dental biofilm by stimulating hydrodynamic effects and also by forcing more efficient brushing movements,<sup>18</sup> agrees with other studies with five-week follow-up<sup>16</sup> and two months<sup>17</sup>. In our study, statistically significant improvement was observed in the same group of people who previously used manual toothbrushing and later used an electric toothbrush.

### Conclusion

There is a statistically significant difference in the reduction of dental plaque and gingivitis when using electric brushing compared to manual brushing.

### Conflicts of Interests

The authors declare no conflict of interest.

### Acknowledgements

None.

### References

1. Salud bucodental. OMS Organización mundial de la salud. Consultado 07 de Agosto 2021 en: <https://www.who.int/es/news-room/fact-sheets/detail/oral-health>.
2. Cuenca Sala E, Baca García P. Odontología preventiva y comunitaria Principios, métodos y aplicaciones. Ed 4. México: Elsevier 2013; 77-87.
3. Lindhe J, P.Lang N, Karring T, et al. Periodontología Clínica e Implantología Odontológica. Ed 5. Buenos Aires Argentina: Medica panamericana. 2009; 187-414.
4. María de Lourdes Mazariegos Cuervo, Heriberto Vera Hermosillo, Carlos Sanz Beard, et al. Contenidos Educativos en Salud Bucal. Centro Nacional de Vigilancia Epidemiológica y Control de Enfermedades. 2003; 6-28.
5. El Shehaby M, Mofti B, Montasser MA, Bearn D. Powered vs manual tooth brushing in patients with fixed orthodontic appliances: A systematic review and meta-analysis. *Am J Orthod Dentofacial Orthop.* 2020; 158(5):639- 649.
6. Salud periodontal y gingivitis. European Federation of Periodontology. 2019; 3-10.
7. Bascones Martínez A., Figuero Ruiz E. Las enfermedades periodontales como infecciones bacterianas. *Avances en Periodoncia.* 2005; 147-156.
8. Reyes Lucena, Magda Karina. Actividades preventivas en pacientes de 3 a 15 años que acuden a atención odontológica en el primer nivel de atención en el centro de salud TII del Mar. México. 2016; 5-21.
9. Page RC. Gingivitis. *J Clin Periodontol.* 1986;13(5):345-59.
10. Bascones Martínez A, Figuero Ruiz E. Las enfermedades periodontales como infecciones bacterianas. *Avances en Periodoncia.* 2005; 147-156.
11. Nápoles González, Isidro de Jesús, Fernández Collazo, María Elena, et al. Evolución histórica del cepillo dental. *Rev. Cubana estomatol.* 2015;(52): 208-216.
12. Løe H, Theilade E, Jensen SB. Experimental gingivitis in man. *J Periodontol.* 1965;36 (3): 177-187. (Kinane DF, Stathopoulou PG, Papapanou PN. Periodontal diseases. *Nat Rev Dis Primers.* 2017;3:17038.
13. Deery C, Heanue M, Deacon S. et al. The effectiveness of manual versus powered toothbrushes for dental health: a systematic re-view. *J Dent.* 2004;32(3):197-211.
14. Yaacob M, Worthington HV, Deacon SA, et al. Powered versus manual toothbrushing for oral health. *Cochrane Database Syst Rev.* 2014; 6: CDOO2281.
15. Ikawa T, Mizutani K, Sudo T, et al. Clinical comparison of an electric- powered ionic toothbrush and manual toothbrush in plaque reduction: A randomized clinical trial. *Int J Dent Hygiene.* 2021;19:93-98.
16. Ccahuana-Vasquez RA, Adam R, Conde E, et al. A 5-week randomized clinical evaluation of a novel electric toothbrush head with regular and tapered bristles versus a manual toothbrush for reduction of gingivitis and plaque. *Int J Dent Hyg.* 2019;17(2):153-160.
17. Ccahuana-Vasquez RA, Conde EL, Cunningham P, Grender JM, Goyal CR, Qaqish J. An 8-Week Clinical Comparison of an Oscillating-Rotating Electric Rechargeable Toothbrush and a Sonic Toothbrush in the Reduction of Gingivitis and Plaque. *J Clin Dent.* 2018;27-32.
18. Digel I, Kern I, Geenen EM, Akimbekov N. Dental Plaque Removal by Ultrasonic Toothbrushes. *Dent J (Basel).* 2020 23;8(1):28.

Cristhal Duque-Urióstegui  
Center For Studies And Research In Orthodontics  
Mexico City, Mexico  
cristhalduque@gmail.com