A laboratory and clinical investigation comparing 2 oscillating/rotating electric toothbrushes


Objectives
The aim of this investigation was to compare the efficacy of the Philips/Jordan HP 735 electric toothbrush with the Braun Oral-B Ultra Plaque Remover (D9) in a laboratory and a clinical study.

Design
Laboratory study: Cross-over with respect to typodonts and brushheads.
Clinical study: Split-mouth, single-blind, randomised.

Materials and Methods
Laboratory study: The removal of plaque substitute from artificial teeth on upper and lower typodonts was evaluated using a robot brushing system. Typodonts were mounted on the robot system and the teeth were cleaned by the robot for 2 minutes (1 minute upper and 1 minute lower typodont) at a brushing force of 1.8 - 2.0 N. After each 2-minute brushing cycle, plaque substitute remaining on the typodonts was measured by means of a computerised analysing system. The percentage of plaque substitute removed was calculated for all surfaces combined (buccal, lingual and occlusal) and for gumline and approximal sites. Each toothbrush was tested 10 times, a new brushhead being used for each test.

Clinical study: A total of 23 subjects (non-dental students) with at least 24 natural teeth and periodontal probing depths of less than 5 mm, were included in the study. Subjects were trained in the use of the two toothbrushes. All subjects in the study received a single oral prophylaxis and were asked not to brush their teeth for 48 hours prior to their appointment. Plaque was scored using the method of Silness & Löe, at 6 sites per tooth. Subjects in the study then brushed two randomly selected conical lateral quadrants with their first assigned brush for 60 seconds, followed by the opposing 2 quadrants for a further 60 seconds with the second brush. After brushing, plaque scores were re-evaluated and the percentage plaque reduction was calculated.

Results

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<tr>
<th>Percentage reduction in plaque (clinical study)</th>
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<tr>
<td>%</td>
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<tr>
<td>All sites</td>
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<td>Approximal vestibular</td>
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<td>Approximal lingual</td>
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* Statistically significant difference in favour of the D9, p<0.05
The laboratory phase of this investigation showed that for all surfaces combined, there was no significant difference in the mean removal of plaque substitute by the two brushes. At vestibular and approximal vestibular surfaces, however, the D9 was significantly more effective.

The clinical phase of the investigation confirmed the results obtained with the robot. Although both the D9 and the HP 735 effectively removed plaque, the D9 was found to be significantly more effective than the HP 735, especially at approximal surfaces.

The mean overall score for plaque before brushing was 1.88 in both groups. Following brushing, the HP 735 was found to have reduced plaque scores by 66%, compared with 74% for the D9. The 8% difference between the two brushes was statistically significant (p=0.03). As shown in the figure, further analysis revealed that the significant difference in favour of the D9 was mainly due to plaque removal from approximal sites. It was concluded that despite the addition of the "active tip" on the Philips/Jordan HP 735 toothbrush, the Braun Oral-B Ultra Plaque Remover (D9) was more effective in terms of plaque reduction, both for the whole mouth and for approximal sites.

Clinical comment
Thorough plaque control is an essential factor in the prevention of gingivitis and the treatment periodontal diseases. In particular, plaque at approximal and interdental sites is known to be associated with the development of localised gingivitis. Although electric toothbrushes are more effective than manual brushes in removing plaque, approximal surfaces, particularly at the back of the mouth, remain the most difficult to clean. In order to enhance plaque removal from these surfaces, the HP 735 has an independently moving "active tip" in addition to the round oscillating/rotating brushhead. Despite this feature, the results from both the laboratory and the clinical phase of this investigation clearly show that the Braun Oral-B Ultra Plaque Remover (D9) is more effective than the Philips/Jordan HP 735, particularly at approximal surfaces.