

The safety of oscillating-rotating powered toothbrushes

Abstracted from

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Safety of oscillating-rotating powered brushes compared to manual toothbrushes: a systematic review. *J Periodontol* 2011; **82**: 5–24.

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Question: Compared to manual toothbrushes are there any adverse effects associated with the use of oscillating-rotating powered brushes?

Data sources PubMed-Medline, the Cochrane Central Register of Controlled Trials (Cochrane-CENTRAL), Embase, together with the reference lists of selected studies were searched.

Study selection Both in vitro and in vivo studies were included with selection being undertaken by two reviewers with a third as arbiter if required. Human randomised clinical trials (RCT) or controlled clinical trials conducted in healthy subjects were included where, the intervention included a rechargeable, oscillating-rotating power toothbrush compared with a manual toothbrush control and a safety assessment was included. Similar criteria were used for in vitro studies.

Data extraction and synthesis Two independent reviewers extracted the data with any discrepancies being decided by a third reviewer. Missing data were calculated and designated accordingly. Meta-analysis was performed where possible using a random-effects model.

Results Thirty-five publications met the criteria. The mean change in gingival recession was not significantly different among toothbrush groups in the two selected trials with safety as a primary outcome (weighted mean difference: 0.03). A meta-analysis of the five trials that evaluated safety with a surrogate parameter was not possible; however, there were no significant between-group differences at the study end in any trial. A descriptive analysis of the 24 selected studies assessing safety as a secondary outcome revealed few brushing-related adverse events. The heterogeneity in objectives and methodology of the four in vitro trials that met the eligibility criteria precluded generalisation of the results.

Conclusions A large body of published research in the preceding two decades has consistently shown oscillating-rotating toothbrushes to be safe compared to manual toothbrushes, demonstrating that these power toothbrushes do not pose a clinically relevant concern to hard or soft tissues.

Commentary

A series of Cochrane systematic reviews has consistently supported the use of powered toothbrushes with a rotation-oscillation action, either when compared to manual brushing or other designs of powered toothbrush.^{1–3} Rotation-oscillation toothbrushes are those with a round head that spins back and forth, one third of a turn in one direction and then the other. Whilst those reviews have considered the safety of rotation-oscillation brushes in passing, they have focused predominantly on their effectiveness.

Van der Weijden and colleagues set out to determine the safety of this design of powered brush as comprehensively as possible. They searched the existing literature using a variety of electronic databases for any study that compared the safety of rotation-oscillation brushes against manual brushes, including all but the weakest levels of evidence. Having extracted the relevant data from the 35 most relevant original papers, the authors grouped them by research design (randomised controlled trials with safety as the primary outcome, trials where safety was a secondary outcome, studies that used a surrogate marker of safety and finally, laboratory-based studies).

Even within these groups, the designs of the original studies were usually so diverse that it was impossible to bring the results together into a single statistical analysis. Nevertheless, the original data consistently failed to find problems with the safety of the rotation-oscillation brushes. The take home message here is that rotation-oscillation brushes do not appear to harm the hard or soft tissues of the mouth any more than does manual brushing. Dentists can therefore continue to recommend the use of this design of powered toothbrush.

Do these conclusions seem a little guarded? There is an unavoidable problem in studies of safety. Science works by falsification. Scientists devise hypotheses and then set out to disprove them. Our hypotheses hold good for as long as the data support them. It follows that it is impossible to prove a negative. In this case that means that it is impossible to prove that rotation-oscillation brushes do not cause harm: all we can say is that so far there is no evidence that they do. The authors might have let themselves off the hook if they had dwelt on this point a little more in their otherwise very comprehensive paper.

Practice points

- Earlier systematic reviews have consistently supported the use of powered rotation-oscillation toothbrushes
- This systematic review found no evidence that such toothbrushes harmed the oral hard or soft tissues
- Dentists can continue to recommend rotation-oscillation toothbrushes to their patients.

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