Manual versus powered toothbrushes for oral health; An update

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Introduction

Dental Plaque

• Periodontal disease: gingivitis and periodontitis
• Which one is better, manual or powered
• Previous Cochrane reviews: Robinson 2005, Heanue 2003
Aims

To compare manual and powered toothbrushes in everyday use, by people of any age, in relation to:

• Plaque removal
• Gingival inflammation

• Secondary Outcomes
  • Removal of staining and calculus
  • Dependability and cost
  • Adverse effects
Method

• Systematic review and meta-analysis

• Cochrane Oral Health Group method

• New quality assessment: Risk of Bias (ROB)
Method

Inclusion criteria

- RCT comparing powered vs. manual toothbrushes
- >1 month duration with ‘every day’ use of brush
- Cross-over trials: wash-out period > 1 week
- June 2004 – March 2011

Search strategy

- COHG Trials Register
- CENTRAL
- MEDLINE
- EMBASE
- CINAHL
Definitions and analyses

• Short term  1 to 3 months
• Long term   >3 months

• Treatment effects measured using:
  Standard mean differences (SMD) 95% CI for multiple indices
  Mean differences (MD) 95% CI if one index was used
Review profile

- Records identified (n=126)
- Records screened (n=108)
- New full articles (n=19)
- Included in qualitative synthesis (n=13)
- New studies included (9 + 41 existing = 50)

Duplicate removed (n=18)
- Existing or Excluded (n=89)
- Excluded (n=6)
# Results: Brush types

<table>
<thead>
<tr>
<th>Type</th>
<th>No. trials</th>
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<tbody>
<tr>
<td>Side to side</td>
<td>9</td>
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<td>Counter oscillation</td>
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<tr>
<td>Rotation oscillation</td>
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</tr>
<tr>
<td>Circular</td>
<td>3</td>
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<tr>
<td>Ultrasonic</td>
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<tr>
<td>Ionic</td>
<td>4</td>
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<tr>
<td>Unknown</td>
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</tr>
</tbody>
</table>
Results

50 trials (4326 subjects)

Plaque
• 42 trials (2523 subjects) short term
• 14 trials (1018 subjects) long term

Gingivitis
• 48 trials (3167 subjects) short term
• 15 trials (1689 subjects) long term
Summary of results

<table>
<thead>
<tr>
<th></th>
<th>Short term</th>
<th></th>
<th>Long term</th>
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<tbody>
<tr>
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<td>Plaque</td>
<td>Gingivitis</td>
<td>Plaque</td>
</tr>
<tr>
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</tr>
<tr>
<td>Counter oscillation</td>
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<tr>
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</table>

Only powered brushes with rotation-oscillation action were consistently better than manual.
Rotation Oscillation

<table>
<thead>
<tr>
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<th>Short term</th>
<th>Long term</th>
<th>SMD (95% CI)</th>
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</thead>
<tbody>
<tr>
<td>Plaque</td>
<td></td>
<td></td>
<td>-0.53 (-0.74, -0.31)</td>
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<td>-0.66 (-1.28, -0.03)</td>
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<tr>
<td>Gingivitis</td>
<td></td>
<td></td>
<td>-0.49 (-0.73, -0.26)</td>
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<tr>
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<td></td>
<td>-0.34 (-0.56, -0.11)</td>
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</table>

Favours powered  Favours manual
‘Clinical implication’

Plaque reduction (TQHI) :
- Short term, 0.2
- Long term, 0.3

Gingivitis reduction (BOP Ainamo Bay index) :
- Short term, 46%
- Long term, 27%
Conclusion

- Rotation-oscillation powered brushes reduced plaque and gingivitis more than manual brushes in short & long term
- No other powered brushes were more effective than manual
- Better quality trials
  - Longer term
  - Attachment loss
  - Standardised indices