Plaque bacteria counts and vitality during use of chlorhexidine, meridol® and Listerine mouthrinses


Aim
To investigate total numbers of bacteria and of viable microorganisms in plaque samples during and after use of three different mouthrinses.

Trial Conditions

Products under investigation
1. meridol® mouthrinse (250 ppm F–)
2. Chlorhexidine rinse (0.2 %)
3. Listerine (phenolic compounds)
4. Control (quinine hydrochloride 0.02 %)

Participants
40 students aged 16–31 years (median age: 24 years)

Methodology
• Plaque sampling: at commencement on all specified tooth surfaces, and after 24, 48, and 72 hours on teeth 15/25, 14/24, and 13/23
• Total bacterial count (BC): by means of dark field microscopy in a counting chamber after ultrasound preparation of samples
• Determination of viable microorganisms: incubation of bacterial samples after appropriate dilution on Schaedler agar, and count of colony-forming units (CFU)
• The resultant percentage ratio CFU to BC shows the relevant Plating Efficiency (PE)
• Vital fluorescence: the plaque samples were stained using fluorescein diacetate and ethidium bromide, and numbers of viable and devitalised bacteria were counted using a photo microscope (wavelength 450–490 nm); results were quoted in %VF

Trial
At the commencement of the trial, the teeth of participants were thoroughly and professional scaled (PI < 0.13). They were then instructed to use 10 ml of the allocated mouth rinse for 1 minute three times daily over 3 days. No other oral hygiene measures were used during the trial period. The trial was conducted on a double-blind, randomised basis. Plaque samples were analysed at the commencement of the trial and on each day of the 3 day rinsing phase.
**Results**

At the commencement of the trial, there were no differences between groups in respect of the parameters investigated. In comparison with the control group, there were reductions in BC, CFU, PE, and VF during the rinsing phase in all other groups (fig.1–2). The increases in the parameters BC/mm², CFU/mm², and PE were small in all groups on the first 2 days of the rinsing phase. On day 3, however, differences between the individual groups became apparent. Results in the Listerine group did not differ significantly from those in the control group, whereas those in the meridol® group differed significantly from controls at all analysis time points. The most marked antibacterial effects in respect of total bacterial count and vitality of bacteria were seen in the chlorhexidine group, followed in order by the meridol® and Listerine groups.

**Figure 1:** Median values of total bacterial counts per mm² tooth surface.

[Graph showing median values of total bacterial counts per mm² tooth surface with different groups indicated.]

**Figure 2:** Median values of CFU per mm² tooth surface.

[Graph showing median values of CFU per mm² tooth surface with different groups indicated.]

Median Plating Efficiency in the chlorhexidine group was 0.002%, compared with 3.3% in the meridol® group, 42.6% in the Listerine group, and 91.8% in the control group. Vital fluorescence for chlorhexidine was 6.7%, compared with 48.2% for meridol®, 54.3% for Listerine, and 92.1% in the control group.

**Conclusions**

Use of chlorhexidine and meridol® mouthrinse ensures that levels of viable bacteria on the tooth surface remain low. This mechanism inhibits the development of new plaque.