In-vitro oral hygiene gel testing using organic plaque simulation

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Objectives: Gels play an important role in daily oral hygiene for special care patients. Therefore, it was the aim (i) to test the cleaning efficacy of experimental gels in-vitro using a new formulation of organic plaque simulation and (ii) to compare with a dentifrice and with toothbrushes alone.

Material and Methods: The experimental series consisted of oral hygiene agents being tested with a commercial toothbrush (Dr.Best, GlaxoSmithKline, Bühl, Germany) and an experimental toothbrush for special care patients. The experimental gels A and B were compared with Crest Pro Health Whitening (Procter & Gamble, Cincinnati, USA), Elmex Gelee (GAAB, Lorch, Germany) and the control water-wet toothbrush.

The study dentition of plastic KaVo teeth (Biberach, Germany) in anatomic position was covered with organic material similar to the natural plaque. All 10 teeth were cleaned using brushes, gels or dentifrice, calibrated force 2.0 N and horizontal movement for 40 s. Each cycle was repeated seven times. The percentage of plaque removal at 30 planimetric fields per tooth was documented by computer-assisted optical planimetry (APP). Cleaning efficacy at single teeth and selected planimetric fields was statistically compared (Mann-Whitney test, multivariate variance analysis).

Results: The cleaning efficacy of the experimental toothbrush was superior to the conventional toothbrush, especially in risk fields interproximally, next to gumline, at root surfaces. Dentifrice did not contribute to increased plaque removal, brushing alone was as effective as gel application. The statistical effect power of toothbrush is 72.5% vs. 41.5 % for gels. The plaque removal buccally and lingually ranged max. 46.1 % (incisors) to max. 50.7 % (premolars) and max. 54.4 % (molars), mesially and distally from min. 4.8 % to max. 40.2 %. The mean plaque reduction at root fields ranged from min. 10.0 % to max. 26.3%.

Conclusions: Oral hygiene gels in home care by nursing or family members and in institutionalized nursing are as effective as tooth brushing with water, however, they do not directly contribute to plaque control. Nevertheless they play a crucial role in substituting saliva, in providing bioavailable fluoride and other medicaments, therefore contributing to oral health. Due to the special, anatomic designed toothbrush for special care patients with bristles of different lengths, it is ensured that interproximal spaces and tooth roots can be cleaned effectively.

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