



**Clinically controlled trial of plaque reduction and
inflammation control of Gingiva using the
ultrasonic tooth cleaning device**

Emmi[®]- dental

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1. Summary

Dental caries and periodontal disease are two major bacterial diseases of the oral cavity which are still very prevalent. Besides microbiological, immunological and genetic factors of resistance to these infections, personal oral hygiene using toothbrushes and fluoride containing dentifrices represents the most important method of prevention. However, the use of abrasive brushes and pastes in the long term leads to the real risk of combined erosive-abrasive lesions on teeth and gums. Therefore, the evaluation of alternative bio-physical methods of non-abrasive reduction of bacterial biofilms on teeth is of great clinical importance. The generation of ultrasound in a selected frequency is in this sense, a plausible approach.

Therefore, the efficacy of plaque control was assessed in a clinically controlled study using the ultrasonic tooth cleaning device Emmi[®]-dental Professional (EMAG AG, Mörfelden-Walldorf, Germany) on 16 subjects aged 20 to 34 years. The reduction of dental plaque on all areas of teeth was intraorally photo-documented and assessed using a modified Planimetric Navy-Plaque Index. Gingival health was also clinically assessed in all areas of the teeth using the Gingiva Index. The study was approved by the Ethics Committee of the University of Witten/Herdecke, Germany and the subjects signed a written consent.

The 28 day study protocol started with meticulous, professional teeth cleaning, a 4 day training period, another 3 day plaque regrowth and the follow-up was documented after 7 and 21 days. The ultrasonic tooth cleaning device, according to the manufacturer (EMAG AG, Emmi[®]-dental), was exclusively activated with ultrasound.

This is therefore the first study that focuses on bio-physical principals of ultrasound, as all other studies in the past focussed on combined sound / ultrasound toothbrushes.

Applying the Planimetric Navy-Plaque-Index, the tested tooth cleaning device, Emmi[®]-dental Professional, demonstrated a well pronounced reduction of plaque after 4 training days and a 3 day plaque regrowth period in all 16 subjects according to the cross-over protocol. This plaque reduction on all areas of teeth, after a single tooth cleaning session, was measured by more than 20 %, compared to the uncleaned teeth. During

the follow-up for 7 and 21 days, the areas free of plaque increased to over 45%.

Plaque reduction was better on the front teeth compared to the posterior teeth. Maxillary and mandibular teeth were equally well cleaned. The assessment of plaque control along the gum line and between the teeth, demonstrated a clear reduction of plaque in these high risk areas.

A parallel assessment of gingival health using the Gingiva Index, demonstrated extremely low scores over the entire study period, indicating that most areas were free of inflammation. Therefore, this tooth cleaning device is contributing significantly to gingival health. According to the Cochrane Reviews of 2005 and 2010, meta-analysis of differently powered ultrasound toothbrushes tested for plaque control and gingival health, combined sound/ultrasound models. Therefore, the results presented in this summary are unique, demonstrating effective plaque removal and the teeth cleaning ability of this one and only, unique, ultrasonic tooth cleaning system. A special advantage of this device is the non-abrasive movement over single sets of teeth at a time, causing no damage (due to abrasive pastes) on teeth and gums. This presents a completely new biophysical dimension of effective teeth cleaning and control of bacterial biofilms, with no brushing action at all.

Clinical conclusion

The tests carried out on the Emmi®-dental Professional ultrasound tooth cleaning system proves effective plaque reduction. The ultrasound tooth cleaning system guarantees gingival health and avoids abrasive brushing movements on teeth and gums. There is no risk of abrasive lesions on teeth and gums.

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