



Dual-Light Antibacterial Photodynamic Therapy: A Study on Oral Health Improvements in Assisted Living Facilities



In collaboration with the City of Helsinki, the University of Helsinki, Hospital District of Helsinki and Uusimaa, and the Metropolia University of Applied Sciences, Helsinki, Finland



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OBJECTIVES

- The need for dental care increases as edentulism decreases. Between 2003 and 2017, the proportion of residents in long-term care without teeth fell from 59% to 31%^{1,2}.
- Several studies have suggested significant deficiencies in oral hygiene maintenance among assisted living residents (ALF). Caries and periodontitis are common. Poor oral health further exposes to systemic diseases and reduces quality of life^{3,4}.
- Preventive treatment is the most effective method of oral health care also for this patient group^{1,2}.
- Regular use of dual-light antibacterial photodynamic therapy (aPDT) improves oral hygiene and reduces inflammation in the surrounding dental tissues^{5,6}.
- The aim of this study was to investigate the impact of dual-light aPDT on oral health in assisted living residents compared to a traditional oral hygiene intervention.

METHODS

- Residents of two ALF in Helsinki were randomized to receive either a standard intervention to improve oral hygiene or a standard intervention with the adjuvant regular use of the double light aPDT method. The aPDT was applied with the Lumoral® Treatment device. Appointments and measurements were made on-site using a mobile dental unit.
- N = 31 in total (3 discontinued).
- Follow-up period 2 months. Randomized:
- Treatment group n=10; standard of care + Lumoral® adjuvant
- Control group n=17; standard of care
- The following clinical measurements were performed: aMMP-8 chairside test; VPI (visible plaque index, modified Sillness&Loe); CPITN (The Community Periodontal Index of Treatment Needs); clinical assessment of oral mucosal moisture/dryness.

RESULTS

- In both groups, a significant reduction in plaque was observed in the VPI measurement. (Figure 1).
- A significant improvement in periodontal status according to CPITN was observed in patients in the treatment group (p=0.0006). No change was observed in the control group (Figure 2).
- The proportion of positive aMMP-8 oral rinse test decreased from 53% to 29% in the control group and from 36% to 27% in the treatment group (p=ns.)
- Frequency of toothbrushing and use of electric toothbrush increased during follow-up (Table 1).
- Self reported feeling of dry mouth decreased 41%-36% in the control group, while it decreased from 45% to 27% in the treatment group (p=ns.). Objective dry mouth frequencies were 53% to 41% and 91% to 73%, respectively (p=ns.)
- Half of those who were using Lumoral (n=5) found it very easy to use, and half were neutral. None of the respondents rated it as difficult to use.

Figure 1

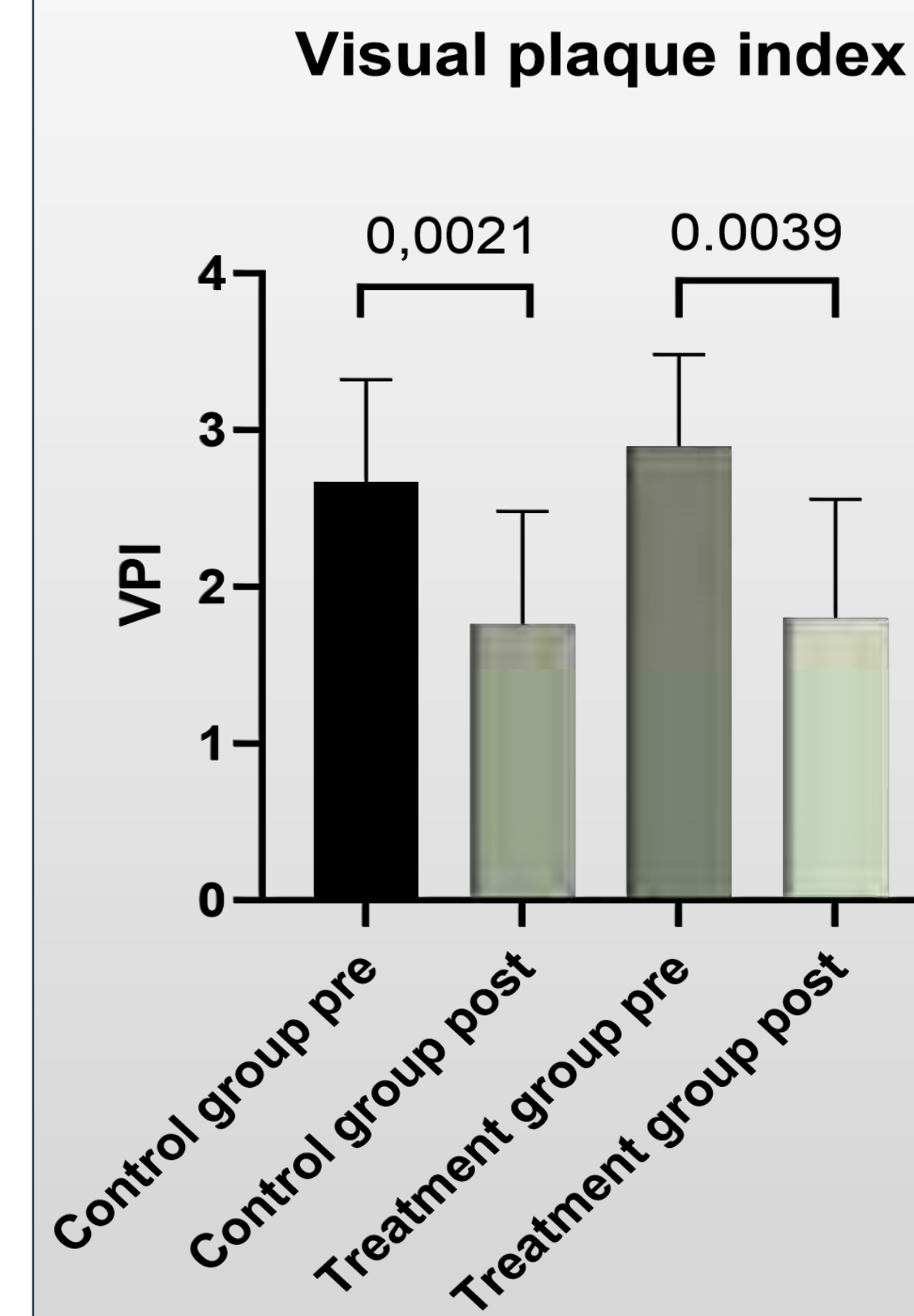


Figure 2

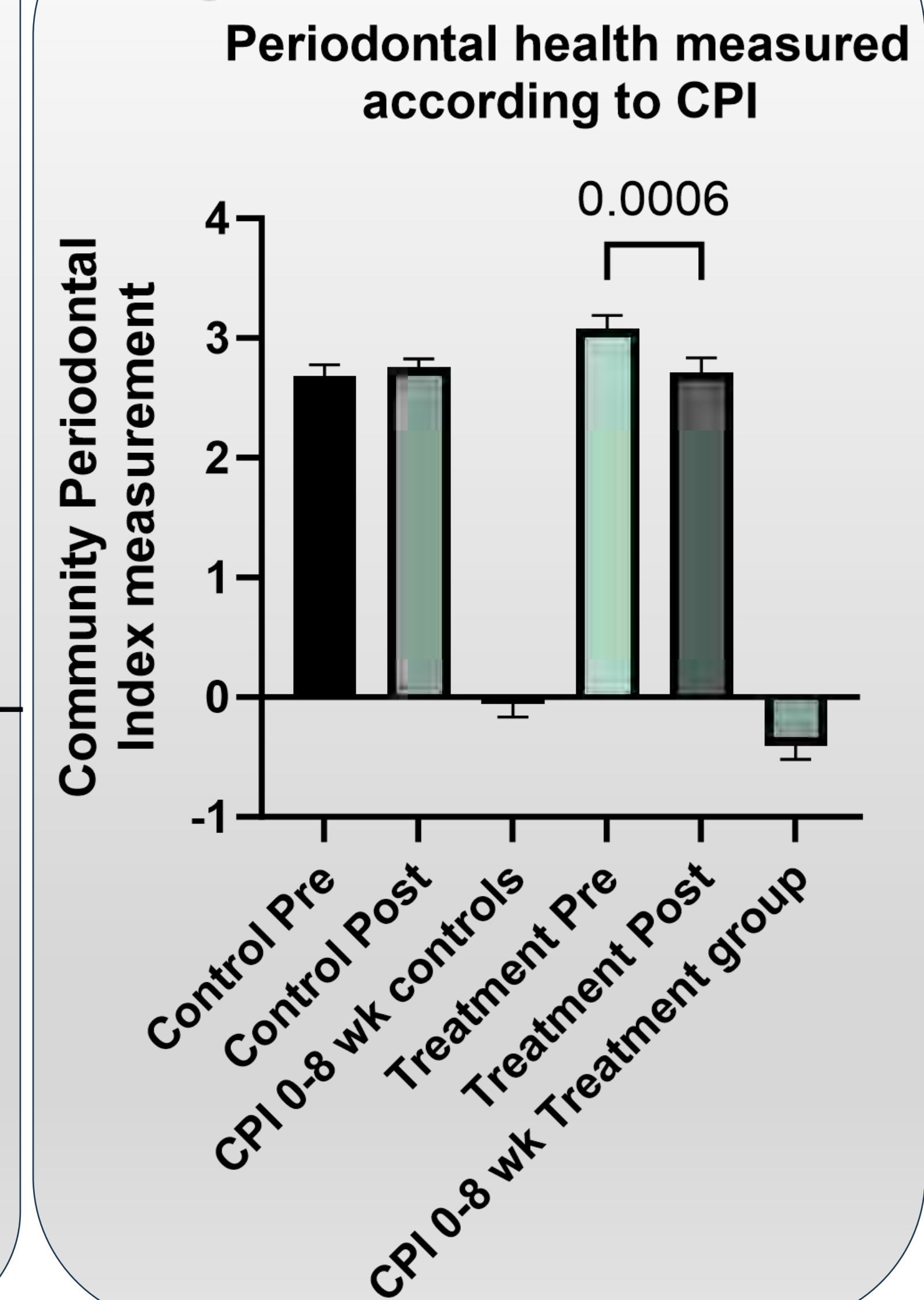


Table 1

Changes in toothbrushing: type and frequency	All patients at first visit [n=28] (%)	All patients at 2 months [n=28] (%)
Type of toothbrush in daily use		
Manual toothbrush	23 (82%)	16 (57%)
Electric toothbrush	3 (11%)	12 (43%)
Missing information	1 (4%)	
Frequency of toothbrushing		
Less than twice a day	16 (57%)	11 (39%)
At least twice a day	11 (39%)	17 (61%)
Missing information	1 (4%)	

CONCLUSIONS

- Regular use of Lumoral® improved the oral health of the subjects according to periodontal measurements. The results are in line with previous publications.
- Dual light aPDT can improve oral health in selected ALF residents as an adjunct to routine oral hygiene. The usability of Lumoral® was rated as at least moderate.
- After one year since the study ended at the Laajasalo nursing home, 80 % of the study participants in the Lumoral® group are still using the device as their weekly routine of oral care.
- The collaboration between different institutions as well as multi-professional teamwork made the success of the study possible.

References: 1) Saarela R., et al. 2020; 2) Saarela R., et al. 2021; 3) Hiltunen K., et al. 2020; 4) Nishizava T. et al. 2019; 5) Pakarinen S. Et al 2022; 6) Nikinmaa S., et al. 2021



ClinicalTrials.gov ID: NCT05853679

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A mobile dental unit and a mobile treatment chair were used to enable the assessments at the nursing homes.



A participant practising the use of Lumoral in the comfort of her wheelchair.