

BACKGROUND

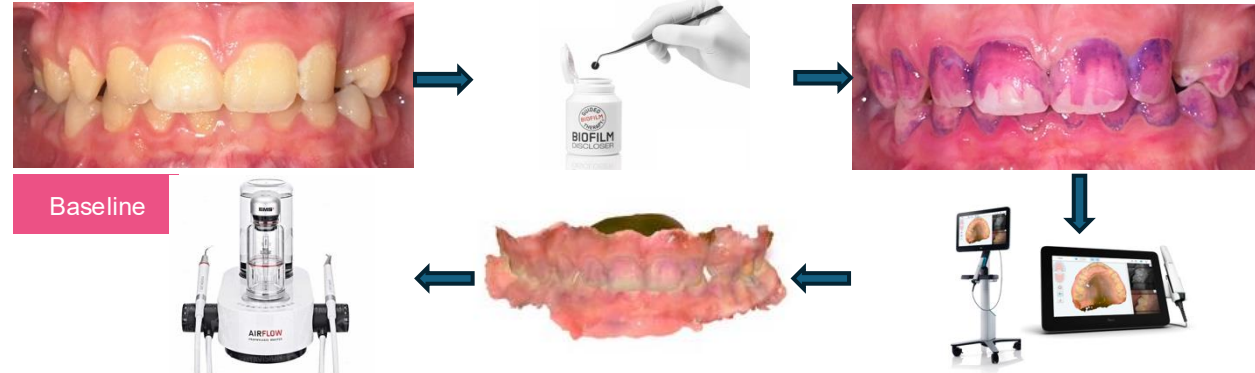
Dental plaque is the primary etiological factor for dental caries and gingival inflammation in children, and objective evaluation of short-term plaque control is essential in preventive dentistry. Guided Biofilm Therapy (GBT) is a contemporary professional prophylaxis approach that aims to remove biofilm effectively and minimally invasively using erythritol-based air polishing, offering a tissue-friendly option for pediatric patients. However, data on the short-term effects of GBT assessed by surface-based, quantitative digital methods remain limited.

PURPOSE

The aim of this study was to investigate the short-term clinical outcomes of air polishing with erythritol using 3D intraoral scanner for planimetric plaque measurement and monitoring.

METHODS

A healthy 12-year-old boy with a high plaque score according to Silness and Loe Plaque index (PI) was evaluated. Prior to Guided-Biofilm-Therapy (GBT) (EMS; Switzerland) dental plaque was disclosed (EMS; Switzerland) and recorded using 3D-intraoral-scanner (iTero Lumina, Align Technology, USA). The percentage of plaque-covered surface area (P%) relative to the total tooth surface area was calculated using specially programmed software area analysis (Image J) based on 3D scanner images of the oral and vestibular surfaces of the four maxillary anterior teeth. Professional plaque removal was performed in accordance with the GBT concept using air polishing with erythritol powder. Oral hygiene instructions were provided to the child. Clinical assessments were conducted before GBT, immediately after treatment, and at the 2- and 4-week follow-ups, with plaque evaluated using the plaque index (PI).



DISCUSSION

This study demonstrates that erythritol air polishing within the GBT protocol leads to a marked short-term reduction in dental plaque, which can be clearly demonstrated using digital methods alongside clinical indices. In line with previously reported digital 2D and 3D plaque assessment approaches, 3D intraoral scanning enabled objective monitoring of plaque distribution and its temporal changes. These findings suggest that digital analyses may serve a complementary role in evaluating GBT effectiveness in pediatric patients, providing greater objectivity and reproducibility than conventional visual scoring. Moreover, the ability of 3D intraoral scanners to detect site-specific plaque accumulation supports their use for longitudinal plaque monitoring in preventive pediatric dentistry.

RESULTS

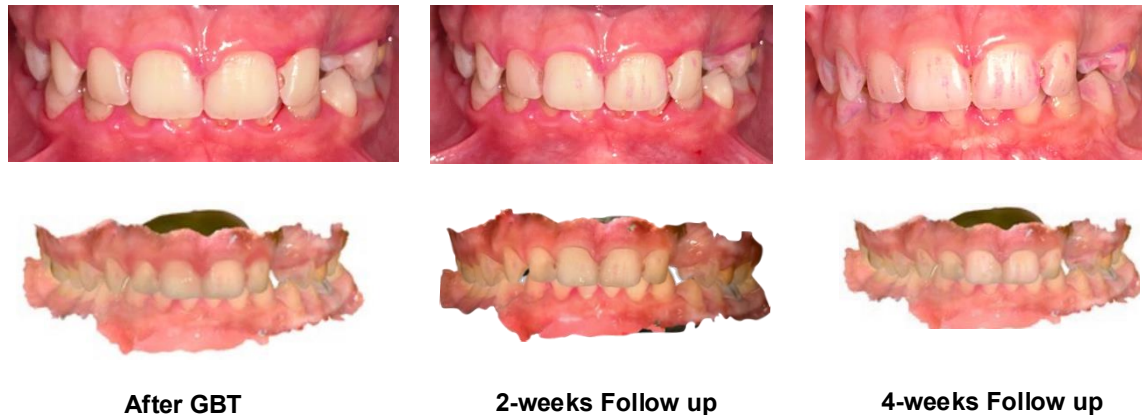


Table 1. PI and 3D-P%S values over time following GBT.

	Baseline	After GBT	2.Week	4.Week
PI	3	1	1	1
3D-P%	72.5% (min-max: 50-90%)	6.5% (min-max: max: 5-9%)	10.4% (min-max: 8-12%)	18.2% (min-max: 15-20%)

PI: Plaque Index, 3D-P%: Plaque-covered area percentage derived from 3D intraoral scan images.

CONCLUSION

3D intraoral scans demonstrated post-brushing plaque reduction and site-specific patterns, while erythritol air polishing within GBT achieved a rapid and sustained short-term decrease in plaque, supporting its use in children and the suitability of 3D scans for plaque monitoring.

REFERENCES

Gunawan, Violina, et al. "Air-polishing technology is an effective alternative chairside method for cleaning dentures." International journal of dental hygiene 22.3 (2024): 626-638.
Giese-Kraft, Katja, et al. "Detecting and monitoring dental plaque levels with digital 2D and 3D imaging techniques." PLoS One 17.2 (2022): e0263722.