

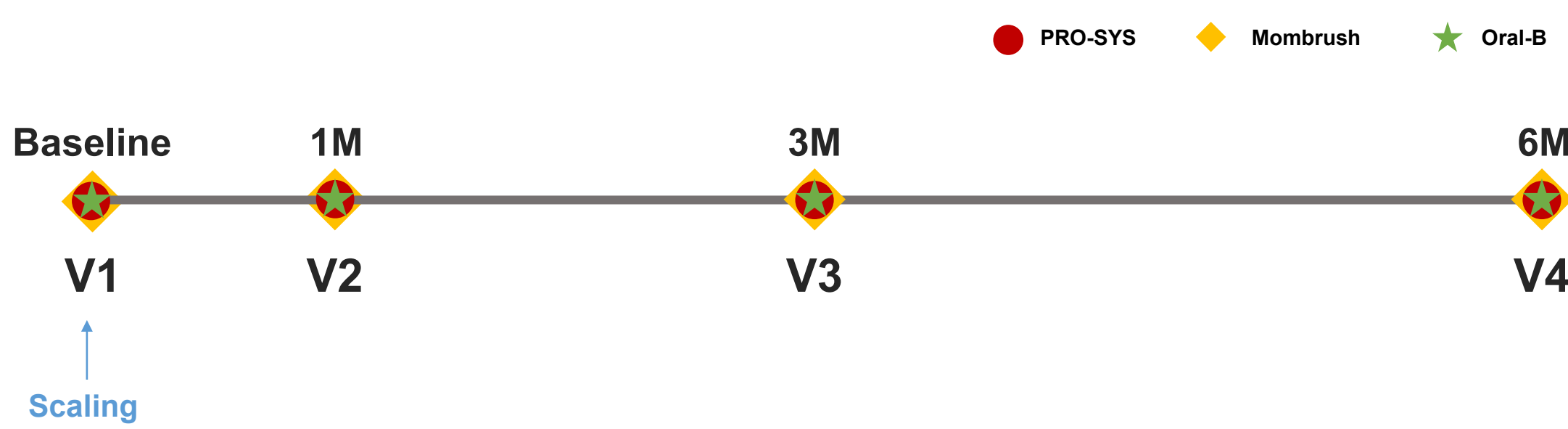
INTRODUCTION

- Smart toothbrushes are technologically advanced toothbrushes that provide personalized feedback on an individual's toothbrushing habits and oral hygiene.
- This study aimed to conduct a 6-month prospective randomized controlled trial to verify the clinical effectiveness of using two smart toothbrushes compared to a manual toothbrush.

METHODS & MATERIAL

Study design

- This study was conducted at the Department of Advanced General Dentistry between January 2021 and May 2022. One hundred and fifty participants were enrolled and evaluation was conducted at four-time points: at baseline and 1, 3, and 6 months.
- Evaluation : Quigley-Hein plaque index (QHI), halitosis values (H2S, CH3SH), caries-related bacteria



Toothbrush type used in the study

- Smart toothbrush (Oral-B; OBG):** After installing the Oral-B application on their smartphone, connect it to the electric toothbrush via Bluetooth to brush their teeth.
- Interactive smart toothbrush (Mombrush, MB):** After installing the Mombrush ProCare application, they were taught how to brush their teeth by watching a video guide on brushing with the rolling method and also registered with the Mombrush manager application.
- Manual toothbrush (PRO-SYS, MTB):** After the toothbrushing instruction training, a brushing diary was distributed to record the number of brushings.



Figure 1. Toothbrush type used in the study

- (A) **Oral-B Genius 8000** (Procter & Gamble, OH, USA)
- (B) **Mombrush** (XiuSolution, Gyeonggi, Korea)
- (C) **PRO-SYS sensitive toothbrush** (Benco Dental, PA, USA)

RESULTS

Table 1. General characteristics of participants

Characteristics	OBG (n=50)	MB (n=50)	MTB (n=50)
Age (years; mean±SD)	29.10±4.72	30.96±8.39	32.66±8.13
Sex			
Male	23 (46.0)	19 (38.0)	19 (38.0)
Female	27 (54.0)	31 (62.0)	31 (62.0)
Education			
High school graduate	10 (20.0)	10 (20.0)	9 (18.0)
Associate degree	5 (10.0)	4 (8.0)	5 (10.0)
Bachelor degree	21 (42.0)	26 (52.0)	23 (46.0)
Master's degree or higher	14 (28.0)	10 (20.0)	13 (26.0)
Number of teeth brushing / day	2.53 ± 0.62	2.72 ± 0.61	2.70 ± 0.61
brushing time (Minutes)	2.84 ± 0.75	3.10 ± 0.81	3.12 ± 0.82

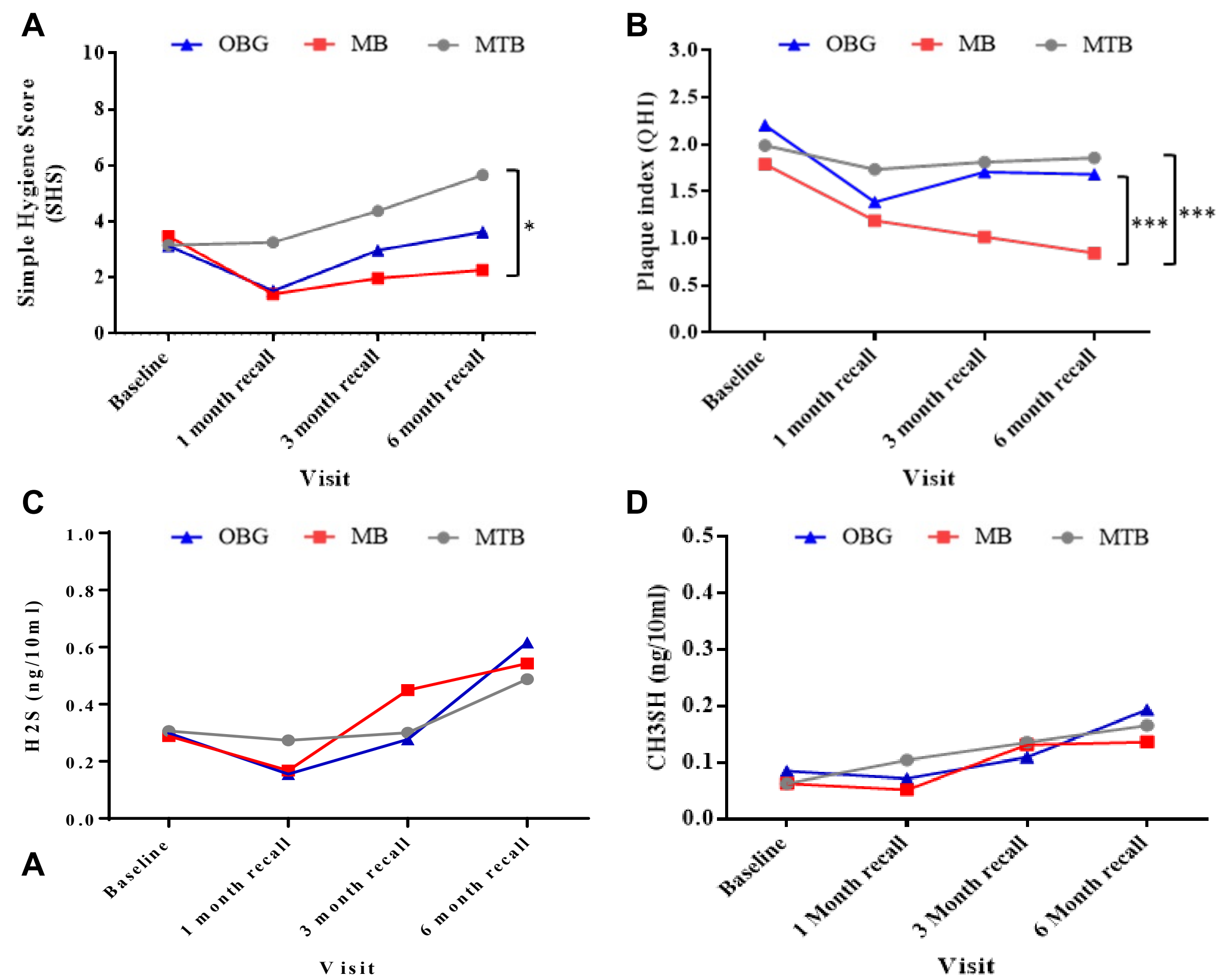


Figure 2. Comparison of SHS, QHI, and halitosis (H2S, CH3SH) values

- The SHS decreased in the MB group compared to the MTB group ($p < 0.05$), and the QHI also decreased in the MB group compared to the OBG and MTB groups at different time points ($p = 0.000$).

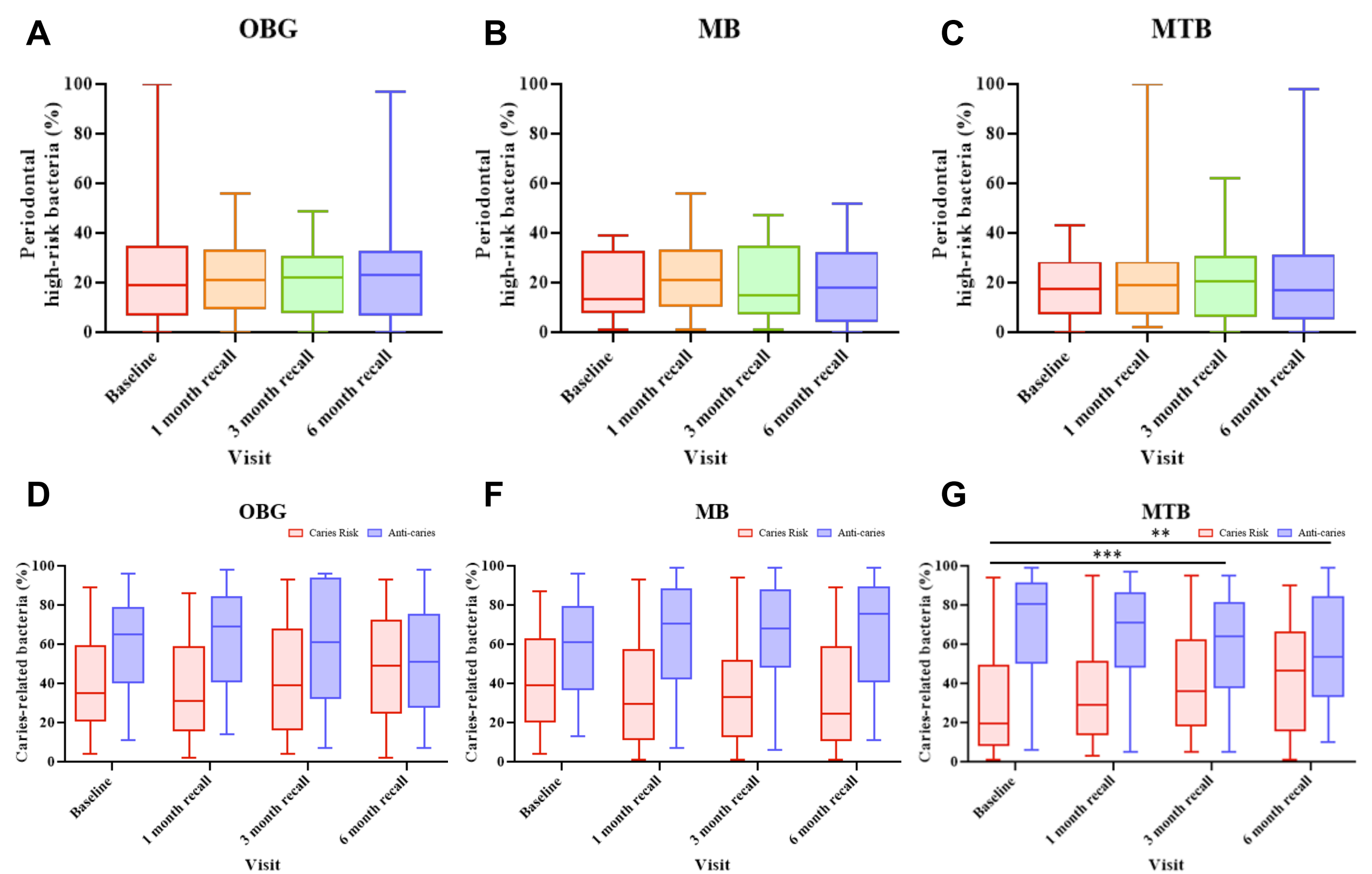


Figure 3. Boxplot of periodontal high-risk, Caries-related bacteria ratios

- There were no significant differences in halitosis and high-risk periodontal bacteria between the groups at these different time points. The ratio of caries-risk bacteria significantly increased, whereas the ratio of anti-caries bacteria decreased in the MTB group ($p < 0.05$).

CONCLUSION

- Our study showed that smart toothbrushes enable proper oral hygiene management for longer periods than manual toothbrushes.
- However, we found that the interest in smart tooth brushing declined at 3 and 6-month recalls, which we presumed to be long recall periods.
- In the future, long-term observational studies to confirm the continuous usage of these smart toothbrushes by the participants after the completion of the study will be performed.

ACKNOWLEDGEMENT

- This research was supported by a grant of the Korea Health Technology R&D Project through the Korea Health Industry Development Institute (KHIDI), funded by the Ministry of Health & Welfare, Republic of Korea. (Grant number: H120C1055)