

CBCT Analysis of Maxillary Sinus Change in the Absence of only Upper First Molar in Asian Population.



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Introduction.

Implants and sinus augmentation have increased, making anatomical knowledge essential to avoid problems. Despite limited Asian population-specific data, CBCT provides precise 3D imaging for evaluation. Sex and age alter sinus dimensions; clinical planning should account for them. This CBCT study examined Asians' maxillary sinus floor, lateral sinus wall, alveolar ridge, and membrane thickness in the presence or absence of first molars.

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Methods

This study retrospectively examined from patients who attended Shuang Ho Hospital, Taipei Medical University between 2023 and 2025, 106 CBCT images with maxillary first molars and 64 from those without. Participants included 77 men and 93 women. All CBCT scans were bilateral and stratified by age: 18–30, 31–50, and 51–70. CBCT scans were taken. Image analysis and measurements were done with Planmeca Romexis®.

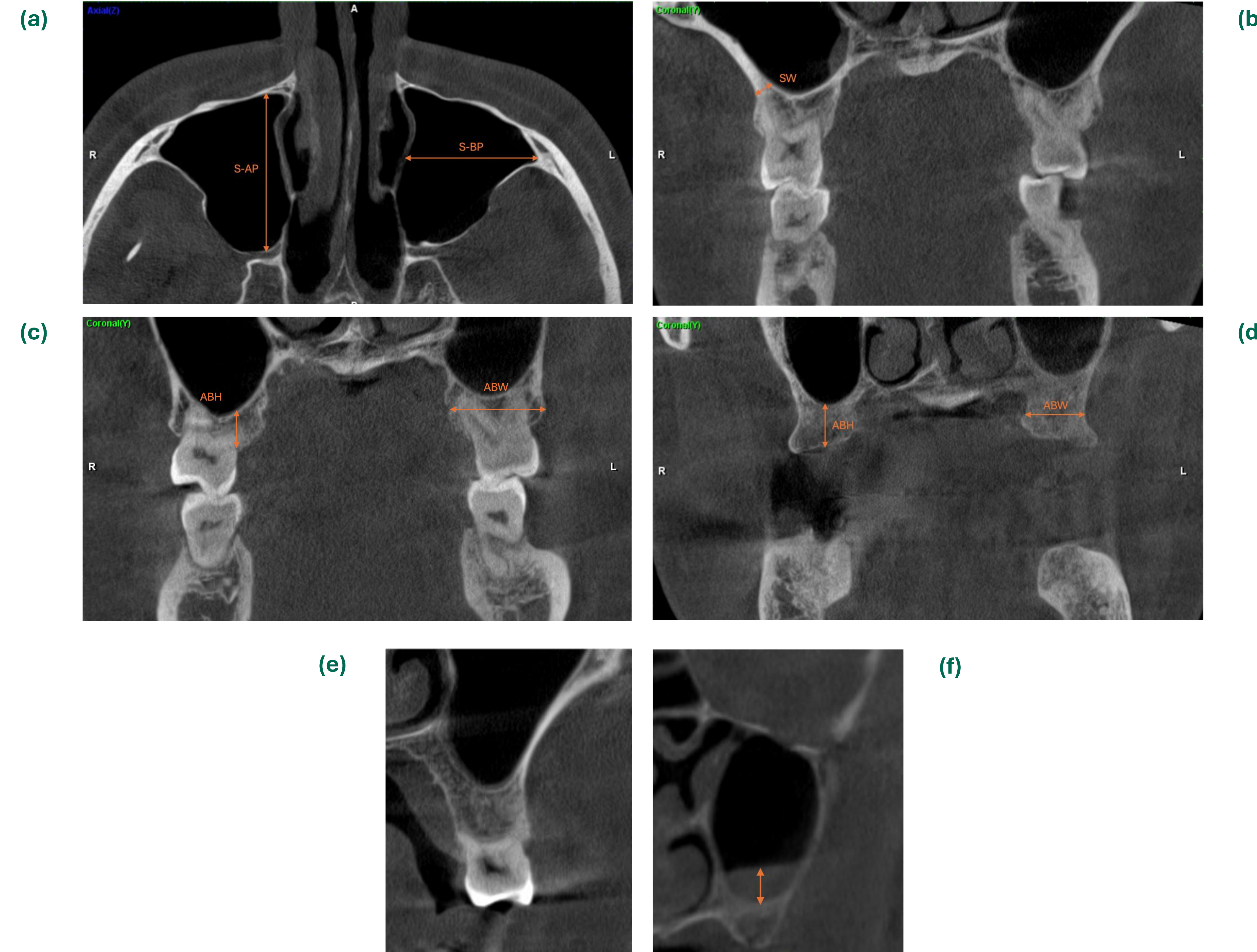


Figure (1). **Cross-sectional CBCT images (a)** anteroposterior length of maxillary sinus (S-AP), and bucco-palatal length of maxillary sinus (S-BP), **(b)** sinus lateral wall thickness (SW), **(c)** alveolar bone height (ABH) and alveolar bone width (ABW) with maxillary first molar, **(d)** ABH and ABW without maxillary first molar, **(e)** Coronal view of CBCT showing the measurement of the Schneiderian membrane thickness at the maxillary first molar region with the present of maxillary first molar, **(f)** with the absent of maxillary first molar.

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Results

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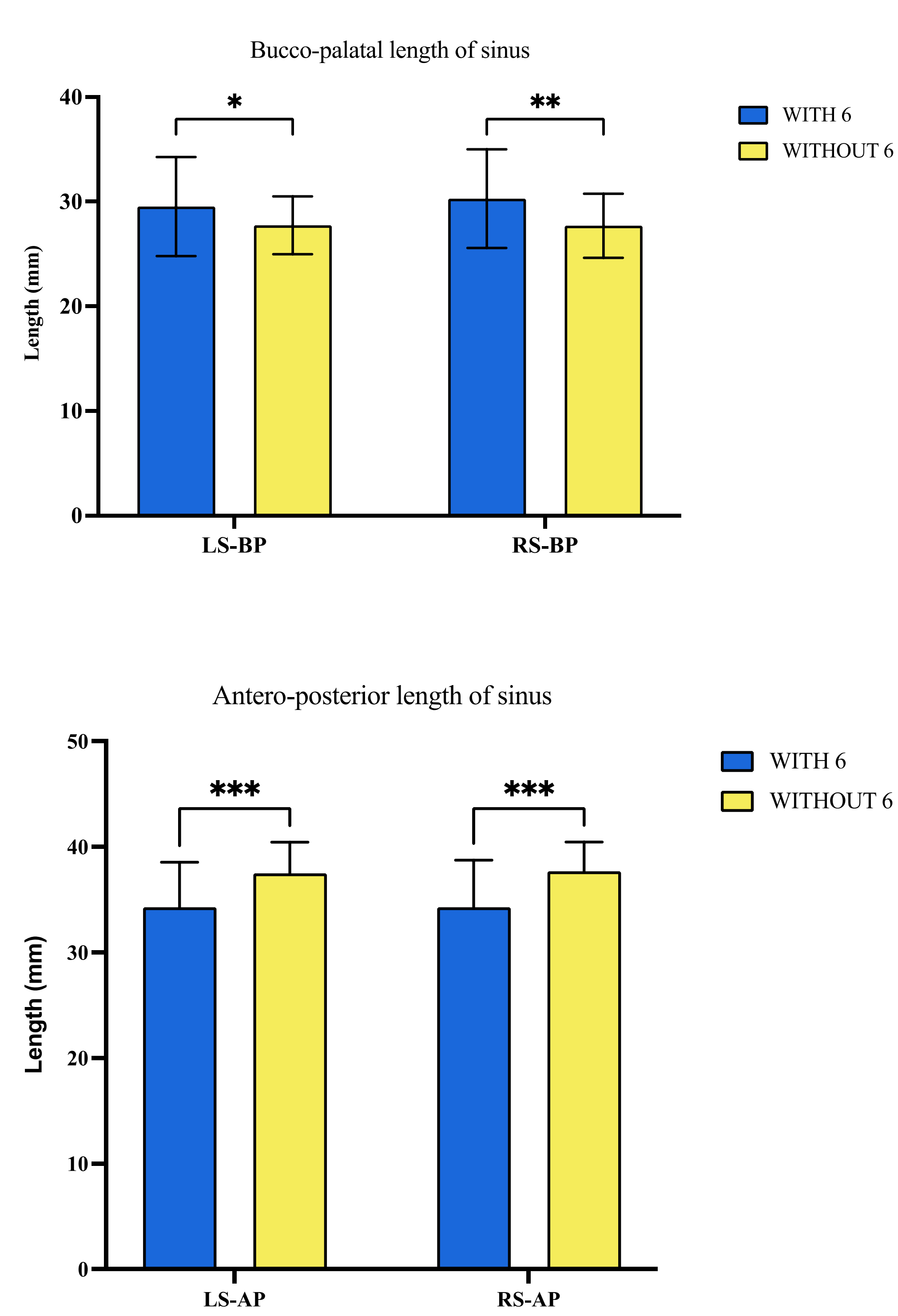


Figure (2). Comparison of (a) the bucco-palatal and (b) anteroposterior dimensions of the left and right maxillary sinuses in subjects with and without the maxillary first molar.

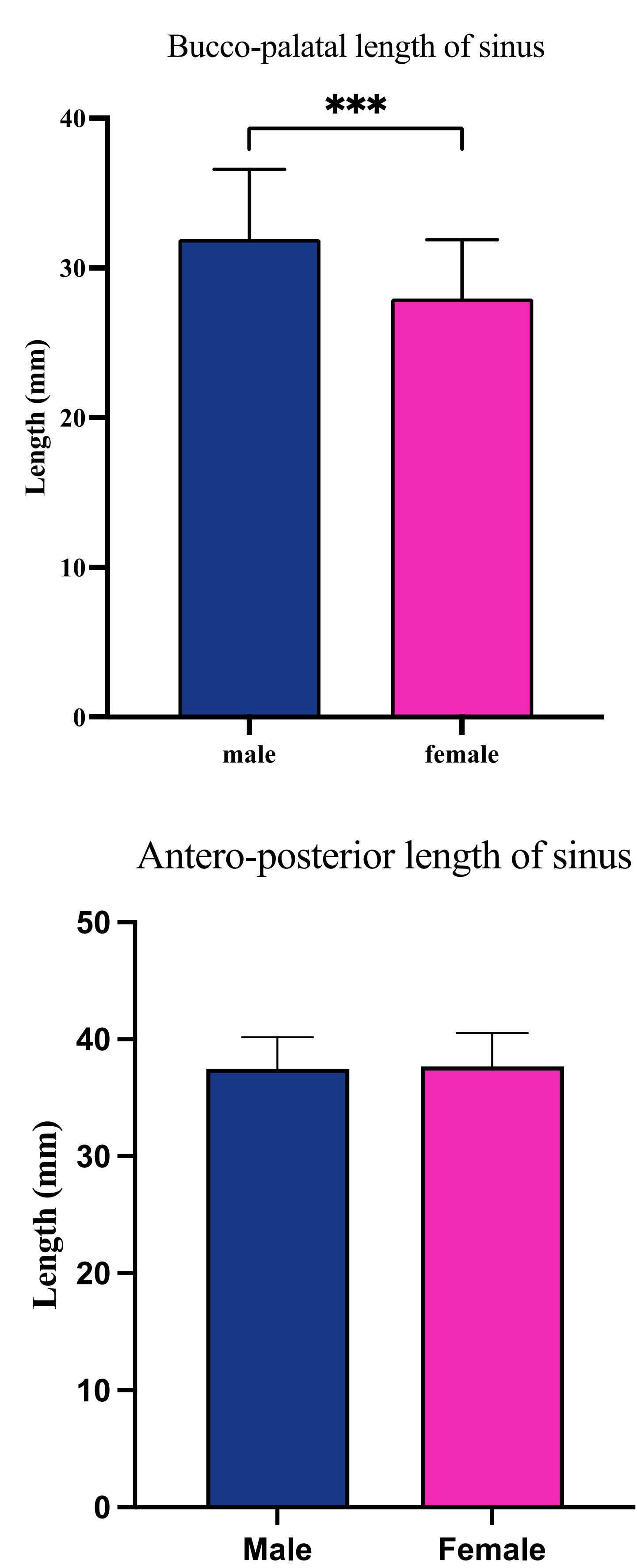


Figure (3). (a) Comparison of the bucco-palatal length, (b) antero-posterior length of the maxillary sinus according to gender.

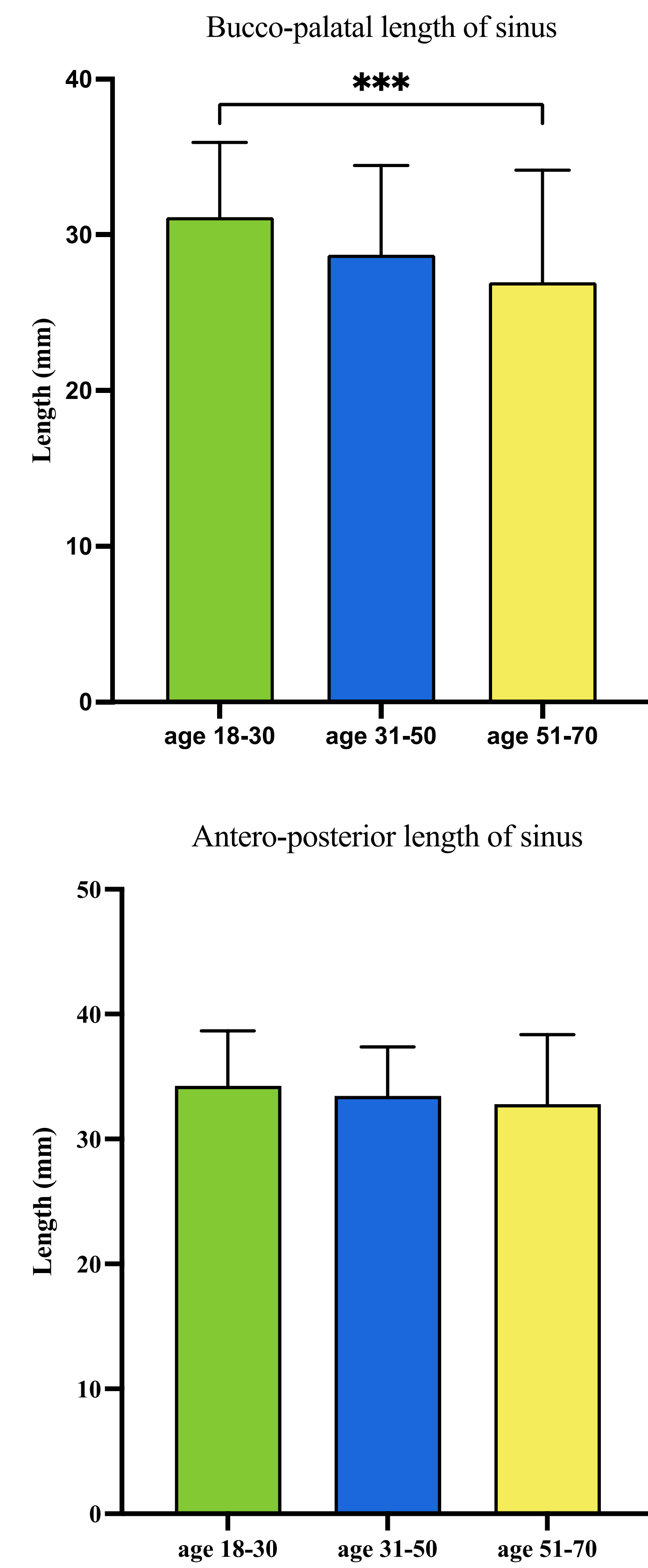


Figure (4). Comparison of (a) the bucco-palatal length and (b) anteroposterior length of the maxillary sinus according to age groups.

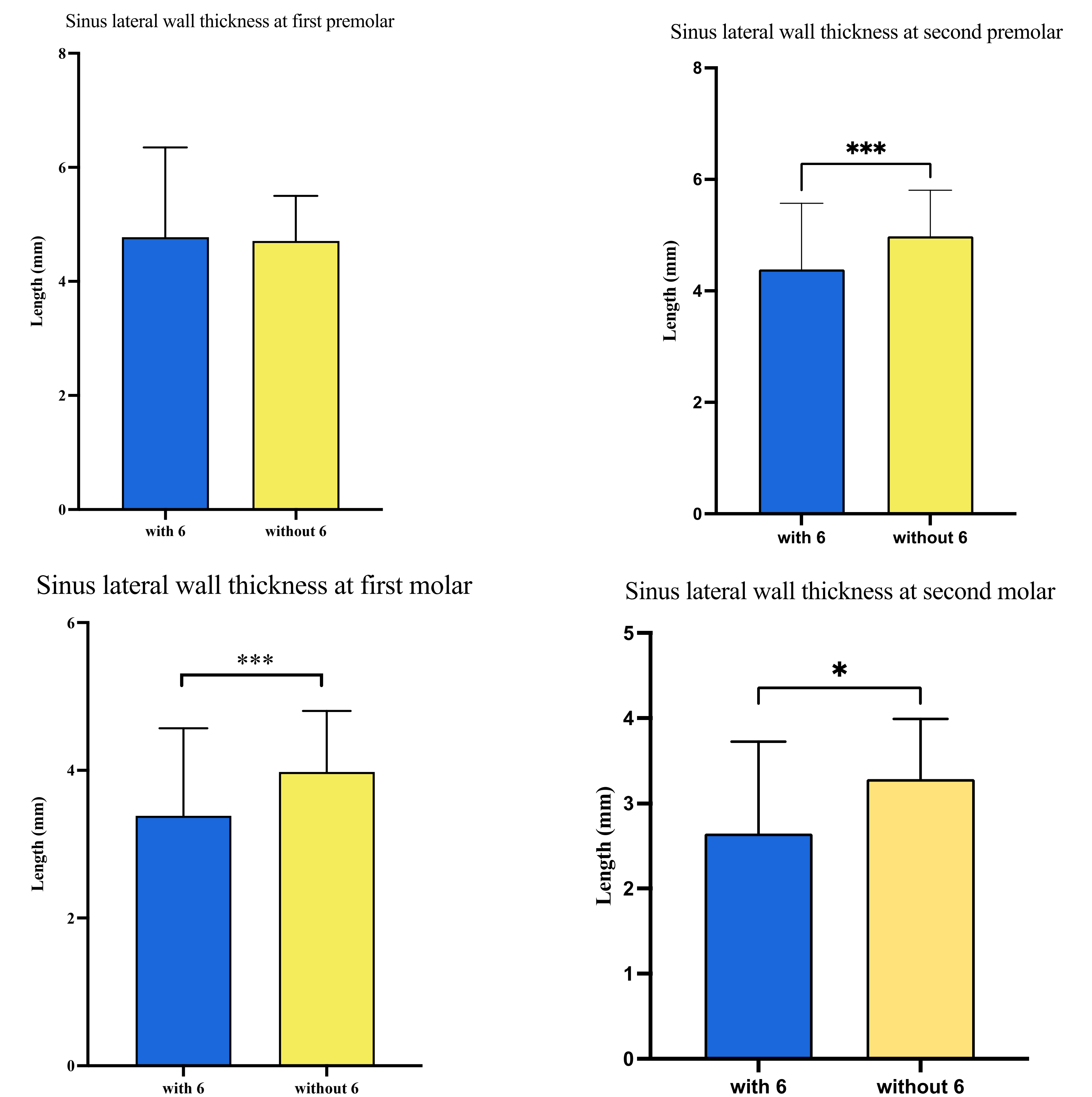


Figure (5). Comparison of the sinus lateral wall measurement at (a) the first premolar region, (b) the second premolar region, (c) the first molar region, (d) second molar region, according to the presence or absence of the maxillary first molar.

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Figure (6). Comparison of the alveolar bone height measurement at (a) the maxillary second premolar region, (b) maxillary first molar region, (c) maxillary second molar region, in the presence or absence of the maxillary first molar.

Table (1) Classification of the membrane thickness showing percentage depending on the presence or absence of the maxillary first molar.

CLASSIFICATION	MEMBRANE THICKNESS	WITH 6 – SUBJECT COUNT	WITH 6 - %	WITHOUT 6 – SUBJECT COUNT	WITHOUT 6 - %
Class 3	Unfavorable (>3mm)	20	10.00%	40	47.62%
Class 1	Favorable (1.5–2mm)	44	22.00%	6	7.14%
Class 2	Normal (0.4–1.49mm, 2.01–2.99mm)	124	62.00%	18	21.43%
Class 3	Unfavorable (<0.79mm)	12	6.00%	20	23.81%

References: Tavelli, L., et al., *Sinus presurgical evaluation: a literature review and a new classification proposal*. Minerva stomatologica, 2017. **66**(3): p. 115-131.

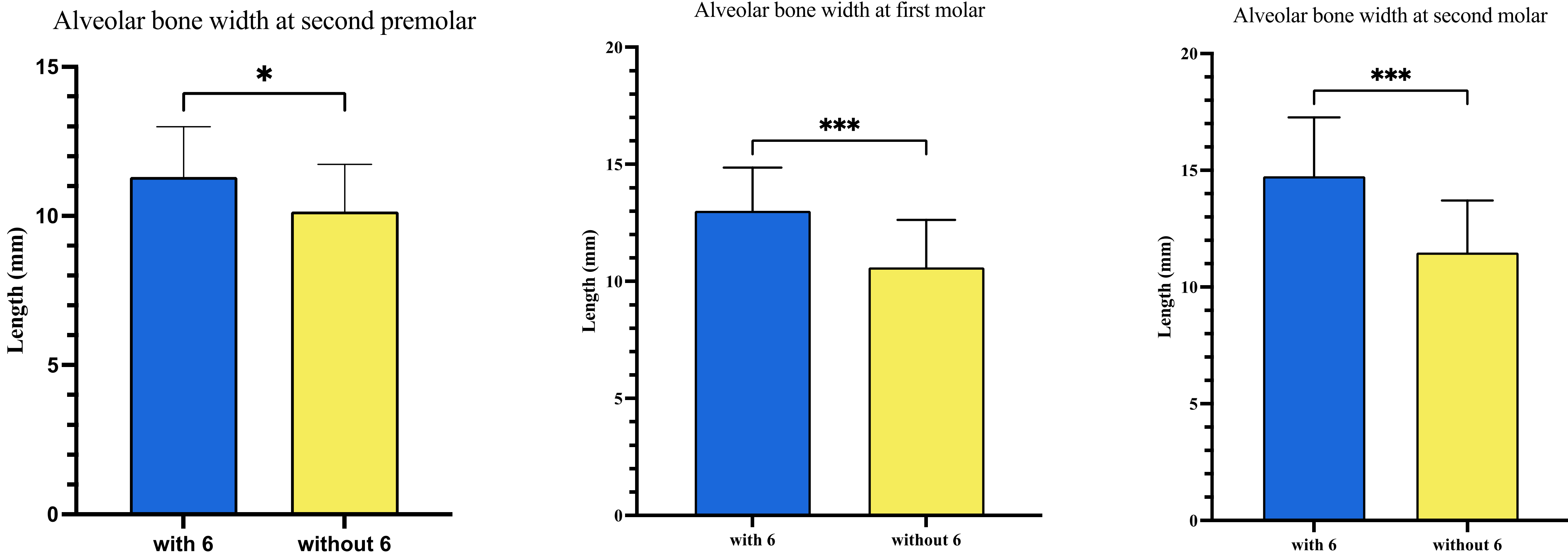


Figure (7). Comparison of the alveolar bone width measurements at (a) the maxillary second premolar region, (b) the maxillary first molar region, (c) the maxillary second molar region in the presence or absence of the maxillary first molar.

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Table (2). Classification based on Alveolar bone height and width at the presence or absence of maxillary first molar, showing the percentage in each category.

Classification		Alveolar Bone Height (mm)	Alveolar bone width (mm)	Subject with 1,6	Percentage %	Subject without 1,6	Percentage %
Class A	Adequate	≥ 10 mm	≥ 5mm bone width	66	31.6	20	23.8
Class B	Barely sufficient	5 to 9 mm	≥ 5mm bone width	108	51.7	18	21.4
			< 5mm bone width	30	14.4	44	52.4
Class C	Compromised	≤ 4mm	≥ 5mm bone width	3	1.4	2	2.4
			< 5mm bone width	0	0	0	0

References: Wang, H.-L. and A. Katranji, *ABC sinus augmentation classification*. International Journal of Periodontics & Restorative Dentistry, 2008. **28**(4).

Conclusion.

- After losing the first molars, Asian's maxillary sinus and alveolar ridge exhibited posterior sinus expansion, lateral wall thickness, and bone resorption beyond the extraction site.
- The combination of membrane thickness and ABC bone classification showed that molar loss increases sinus membrane difficulties and bone status to impaired or borderline-sufficient.
- These findings show that CBCT-based categorization can help to predict implant placement complexity and that first molar preservation is essential in posterior maxillary treatment planning.