

Superior-Inferior Distance of the Inferior Alveolar Nerve from the Lower Border of the Mandible in the Malaysian Population

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Introduction

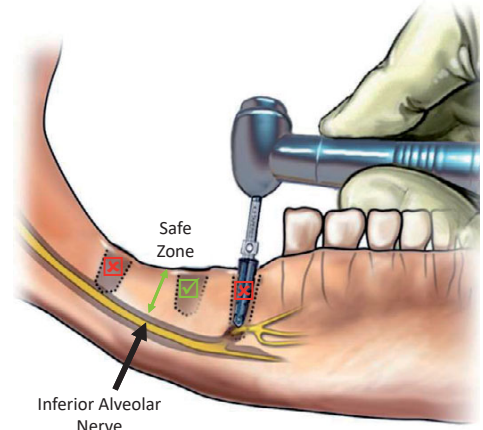


Figure 1: Without accurate determination of the safe zone, risk of injury to the IAN is high during implant osteotomy

- The accurate determination of the safe zone for implant osteotomy by cone beam computed tomography (CBCT) reduces the risk of iatrogenic injury to the inferior alveolar nerve (IAN).
- However, in low resource settings, CBCT is neither accessible nor affordable.
- Therefore there is a need for alternative strategies when CBCT is not available.
- If we can predict the superior-inferior distance of the inferior alveolar nerve (SIDIAN) from the lower border of the mandible, we could then calculate the safe-zone by subtracting the SIDIAN from the entire width of the mandible; without the use of CBCT.
- To develop a predictive algorithm of the SIDIAN in individuals, various input parameters specific to the target population would be required.
- Thus, baseline data pertaining to the SIDIAN from the lower border of the mandible in the Malaysian population is much needed.

IMU Oral Health Centre: 100 CBCT DICOM patients files

iCAT software: SIDIAN from the lower border of the mandible in the molar regions on both sides

SPSS software: statistical analysis to determine symmetry & age-, ethnicity- and gender-associated variations

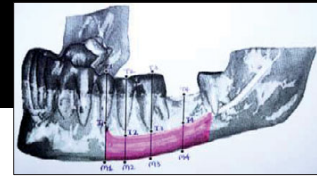


Figure 2a: Reference measurement: SIDIAN from the lower border of the mandible in the premolar & molar regions on one side



Figure 2b: Estimation of the inferior alveolar nerve canal



Figure 2c: Highlighted inferior alveolar nerve canal



Figure 2d: SIDIAN from the lower border of the mandible in the molar regions on both sides

Objective

- To measure the SIDIAN from the lower border of the mandible in the molar region (both sides) in Malaysian patients.
- To evaluate age-, gender-, ethnicity-associated variations in the SIDIAN from the lower border of the mandible in Malaysian patients.

Figure 2: CBCT Image Analysis

Results

Characteristics	N
Gender	100
Male	48
Female	52
Ethnicity	100
Malay	34
Chinese	35
Indian	31
Age category	100
18-30 years	51
31-80 years	49

Table 1: Patient Demographics

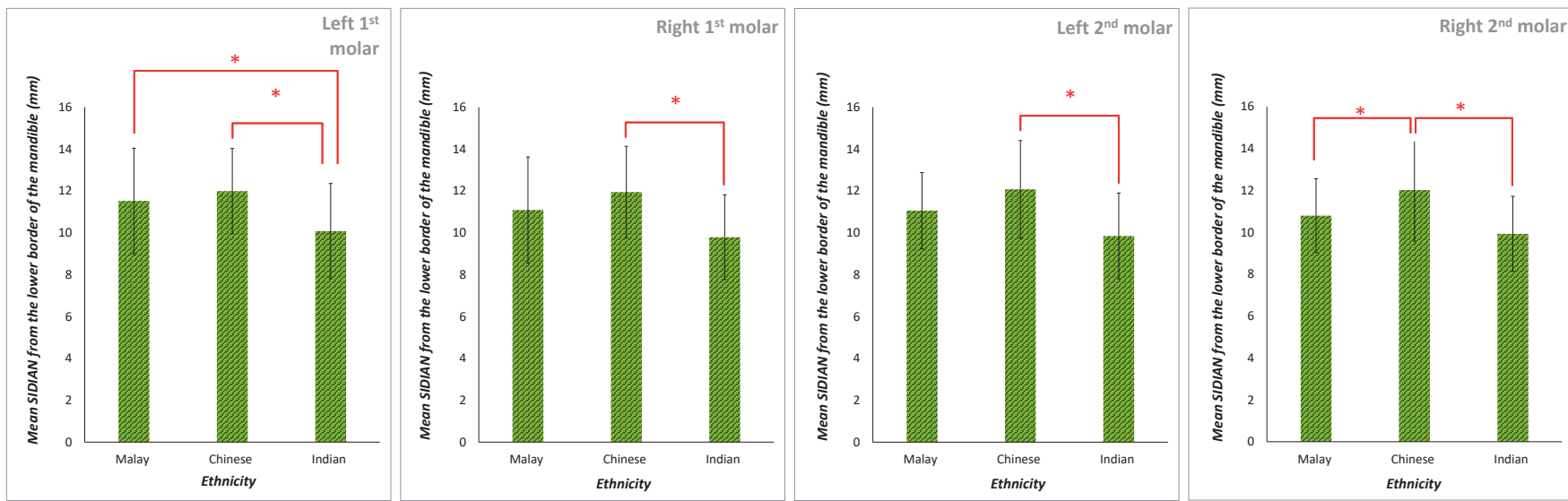


Figure 3: Statistically significant differences in the SIDIAN from the lower border of the mandible were observed between different ethnic groups in the 1st and 2nd molar regions on the left and right side (*P<0.05)

Side	Molar Region	N	Mean	Standard deviation	Minimum	Maximum	Range
Left	1 st	100	11.24	2.25	6.00	17.69	11.69
	2 nd	100	11.04	2.25	6.51	16.00	9.49
Right	1 st	100	10.99	2.41	4.75	16.75	12.00
	2 nd	100	10.96	2.19	6.38	15.75	9.37

Table 2: Summary of SIDIAN from the lower border of the mandible

	Group			Group (Total)	ANOVA (P value)
	Malay (N = 34)	Chinese (N = 35)	Indian (N = 31)		
Left side					
First molar					
Mean	11.52	11.99	10.07	11.24	0.003
Standard deviation	2.52	2.04	2.27	2.40	
Minimum	7.52	8.01	6.00	6.00	
Maximum	17.69	16.31	14.80	17.69	
Second molar					
Mean	11.06	12.09	9.85	11.04	0.000
Standard deviation	1.82	2.32	2.05	2.25	
Minimum	7.09	6.51	6.52	6.51	
Maximum	14.34	16.00	13.45	16.00	
Right side					
First molar					
Mean	11.09	11.95	9.79	10.99	0.001
Standard deviation	2.53	2.19	2.02	2.41	
Minimum	4.75	8.20	4.77	4.75	
Maximum	16.75	16.01	14.84	16.75	
Second molar					
Mean	10.80	12.02	9.93	10.96	0.000
Standard deviation	1.73	2.44	1.79	2.19	
Minimum	7.25	6.38	6.75	6.38	
Maximum	14.56	15.75	13.70	15.75	

Table 3: Summary of SIDIAN from the lower border of the mandible stratified by ethnicity

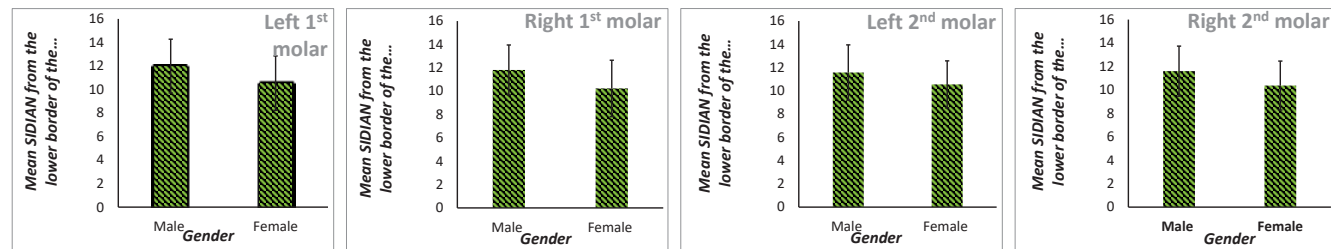


Figure 4: No gender-associated statistically significant differences in the SIDIAN from the lower border of the mandible were observed in the 1st and 2nd molar regions on the left and right side (*P<0.05)

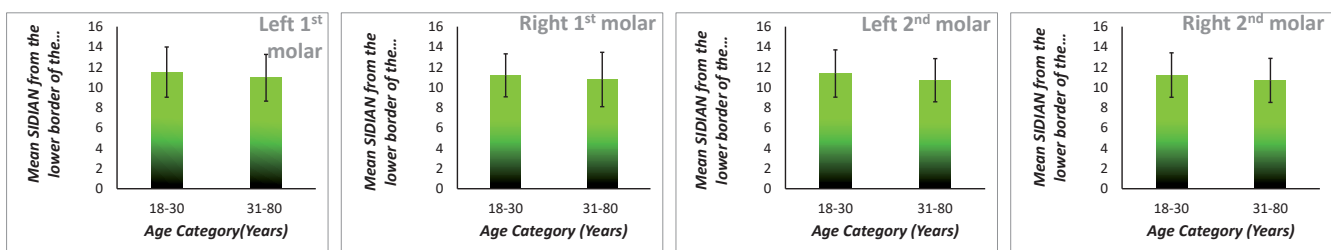


Figure 5: No age-associated statistically significant differences in the SIDIAN from the lower border of the mandible were observed in the 1st and 2nd molar regions on the left and right side (*P<0.05)

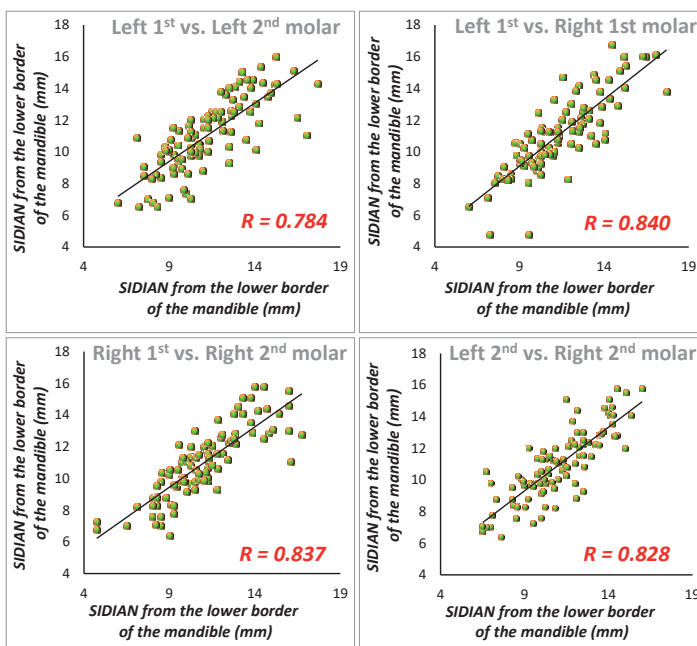


Figure 6: Strong positive correlation exists between the SIDIAN from the lower border of the mandible of both molar regions and sides

Conclusion

- Wide range in SIDIAN from the lower border of the mandible was observed across the study population.
- Ethnicity-associated variations were identified.
- The strong positive correlations on both sides of the mandible indicate the presence of symmetry.
- Measures to compensate for drifting and tilting of teeth were taken to determine the location of the IAN.
- Future studies to include the assessment and correlation of additional anthropometric variables and other mandible dimensions.
- These additional variables may aid in the development of a robust algorithm that can be used towards determining the safe zone for implant osteotomy in the posterior mandible when CBCT is not available.



Figure 7: Severe drifting & tilting