

Occlusal-polygon Area and Carabelli-cusp: Dental Anthropology Characterization

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Background:

The relationship between the Occlusal-polygon Area (OPA) and the Carabelli-cusp (CC) contributes to the anthropological and forensic analysis of sexual dimorphism, bilateral symmetry, correspondence and biological relationship of human molars, to understand the historical, cultural and biological processes that have resulted in the ethnic variation of humanity with respect to its geographical distribution (Figure 1).

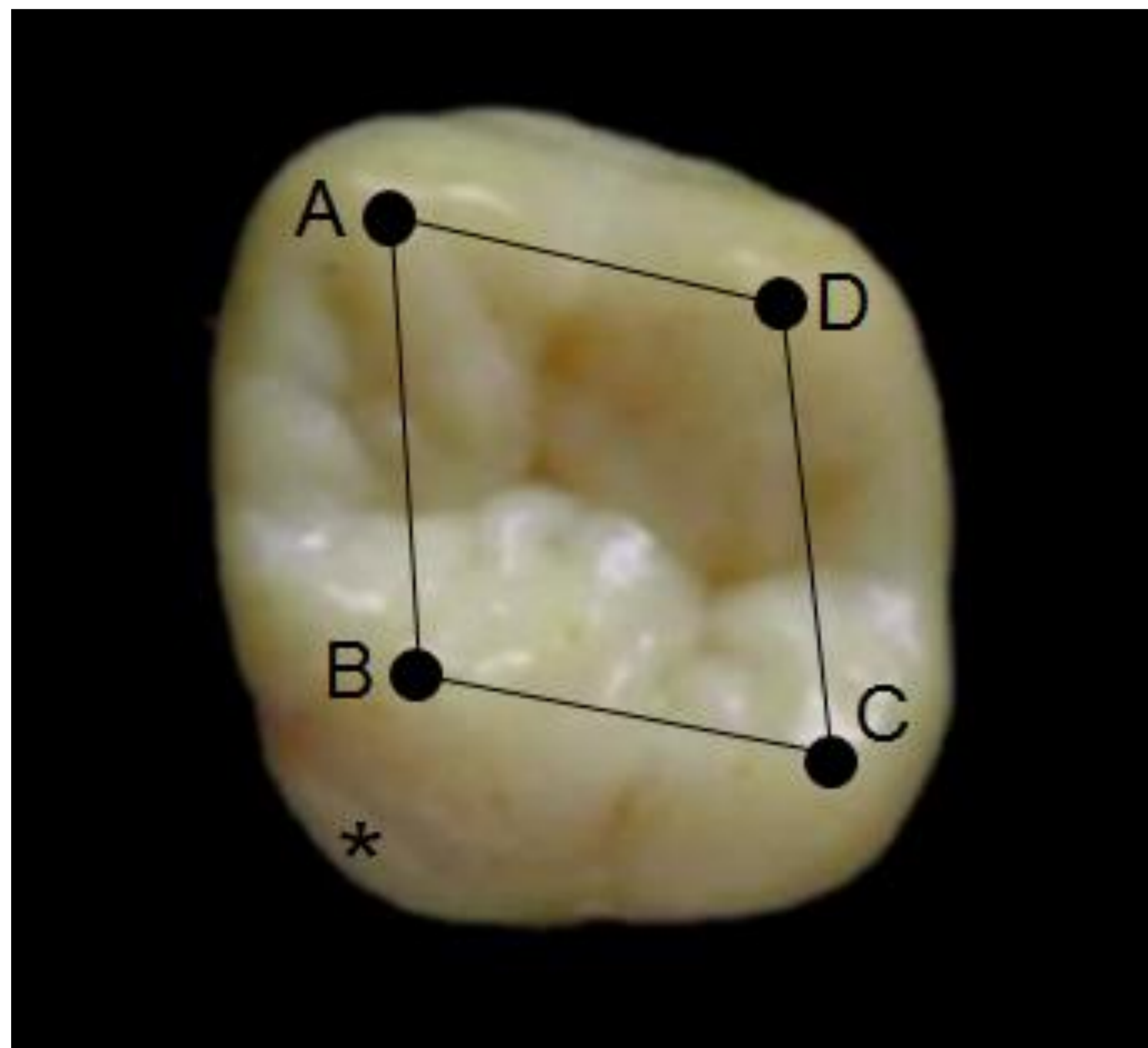


Figure 1. Identification of the cusps from the occlusal surface of a permanent upper right first molar:

- A. Cusp 1, mesiovestibular, paraconus.
- B. Cusp 2, mesioopalatine, protoconus.
- C. Cusp 3, distovestibular, metaconus.
- D. Cusp 4, distolingual, hypoconus.
- * Carabelli cusp.

Aim:

To determine the relationship between OPA and the expression of CC in the second upper temporary molars and permanent upper first molars of ten Colombian ethnic groups.

Methods:

Cross-sectional descriptive observational study that determined the average of the OPA and the frequency and variability of the CC of the deciduous upper second and permanent first molars in 610 previously obtained maxillary casts of 340 girls and 270 boys, of ten ethnic groups. Colombians indigenous Embera, Nasa, Misak and Ticuna; Afrodescendants of Quibdó, Istmina and Cali; and Caucasoid mestizos from Quibdó, Cali and Popayán (Figure 2). The OPA and CC data were processed in the EPIDAT 4.2® Software and SPSS 21® using parametric and non-parametric statistical tests. $P < 0.05$ was considered statistically significant.

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Figure 2. Geographical location of ten Colombian ethnic groups taken into account in this study:

1. Afrodescendants, indigenous and Caucasians mestizo of Chocó.
2. Caucasians mestizo and Afrodescendants of Cali.
3. Misak indigenous, Nasa indigenous and Caucasians mestizo from Cauca.
4. Ticuna indigenous of Amazon.

Results:

OPA was higher in indigenous Ticuna and lower in Afrodescendants of Istmina. There was sexual dimorphism for deciduous upper second molars and bilateral asymmetry for permanent upper first molars. For the CC, pit and cusp expressions were grouped, grades 1-4 being more frequent than grades 5-7, according to ASUDAS. When comparing the fossa or cusp expression of the CC with the OPA, no significant differences were found. Expression of CC did not influence the OPA of deciduous and permanent molars (Table 1).

Table 1

Ethnic group	Average occlusal-polygon area (OPA) by ethnic group in mm ²			
	Molar teeth			
	55	65	16	26
Embera indigenous	22,38	23,61	28,20	28,25
Nasa indigenous	22,00	22,91	28,54	28,44
Misak indigenous	23,51	23,76	30,36	30,66
Ticuna indigenous	24,78	25,02	30,98	32,36
Quibdó Afro-descendants	22,38	21,98	28,53	28,69
Istmina Afro-descendants	20,81	21,31	29,51	30,35
Cali Afro-descendants	22,95	22,28	28,44	29,03
Quibdó caucasians mestizo	21,97	23,45	27,30	26,99
Cali caucasians mestizo	21,19	22,04	29,14	30,55
Popayán caucasians mestizo	22,48	22,91	27,98	29,36
Expression (CC)	Frequency (%) of the Carabelli-cusp (CC) according to the expression pit / cusp*			
	Molar teeth			
	55	65	16	26
Pit	91,2	91,5	83,61	84,59
Cusp	8,8	8,5	16,39	15,41

*Consolidated for all ethnic groups

Conclusions:

The average of OPA allowed the association of the ethnic groups according to the level of intermingling, being considered as mesodontes with a tendency to microdontia –higher level of miscegenation– the mestizos and Afro-descendants of Cali and the natives Nasa and Misak; while the Embera and Ticuna Indians –the lowest level of miscegenation– were considered mesodontes with a tendency to macrodontia. The pit expressions of the CC were more prevalent than the cusp expressions. The pit expression did not affect the OPA averages; OPA and CC did not present sexual dimorphism or bilateral asymmetry.