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Dental Non-Metric Traits in a Pre-Conquest Sample "Calchaquí" From Argentina, South America

Rasgos Dentales No-métricos en una Muestra Pre-Conquista "Calchaquí" de Argentina, América del Sur

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SUMMARY: The present study was carried out with a Calchaquí human Pre-Conquest sample from Northwest of Argentina, with the aim of exploring the dental morphology patterns in this population. This study was carried out by means of a macroscopic analysis in permanent dentitions of 7 skulls. 40 dental non-mtetric traits were recorded using the ASU Dental Anthropology System. Percentages >70% was found only in 4 traits. Calchaquí sample studied here is near to these values in shovel shape expression, but the results of this study suggest that a Sinodont pattern is no clear for this sample. To conclude, the present investigation provides additional, insightful elements for a description of biological factors in the process of dental morphologic diversification associated to regional and temporal ranges in this region of Argentina.

KEY WORDS: Bilateral asymmetry; Dental non-metric traits; Pre-conquest samples; Argentina.

INTRODUCTION

Dental morphology trait expressions have been used in anthropology and forensic sciences for determination of biological and geographical affiliations. Variations in morphology of crowns may be manifest in the primary and/or permanent dentitions. Dental variation is heritable, is caused by multiple genes, and is little influenced by environmental factors (Rodríguez-Flórez *et al.*, 2006). By mean of dental morphology analyses is possible an assessment to genetic population dynamics. Assuming the use of additive hereditary traits, the phenotypic differences among distinct groups or samples can be interpreted as differences in genotypic composition (Varela & Cocilovo, 2000). Nonmetric dental traits are highly controlled by genetics and are relatively free of sex- and age-bias (Scott & Turner, 1997). Therefore, phenetic (phenotypic) similarity can be said to approximate genetic similarity. The analysis of biological relatedness using dental nonmetric traits has proven reliable even in commingled samples when standardized procedures are followed (Ullinger *et al.*, 2005). For these reasons, reconstruction of biological relationships between ancient human groups using teeth is an important research problem for South American bioarcheologist. The present study was carried out with a Calchaquí human Pre-Conquest sample from Northwest of Argentina, with the aim of exploring the dental morphology patterns in this population (Bollini, 2004).

MATERIAL AND METHOD

Pre-Conquest human dental remains with reasonably reliable stratigraphic contexts are relatively rare from Northwest of Argentina (Salta, Catamarca, and Tucuman Provincies). Marcellino & Colantonio (2000) suggest a Late Period between 0 and 1500 A.D for this sample. This study was carried out by means of a macroscopic analysis in permanent dentitions of 7 skulls (Fig. 1): 604-643-644-687-602-601-471 (Museum Catalogue References). 40 dental non-mtetric traits were recorded. The ASU Dental

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Anthropology System was used to register the expression grade of all dental traits (Turner *et al.*, 1991). The sample belong to División de Antropología del Museo de Ciencias Naturales (La Plata, Argentina). Binary record system was employed, grouping all grade expressions into both "presence" (1) and "absence" (0) categories.

Fig. 1. Upper arcade of Calchaquí skull 643.

RESULTS

Frequencies of trait presence are in Table I. Percentages >70% was found in 4 traits: shovel shape (UI1, UI2), and tuberculum dentale (UI2, UC). Values between 0.1 and 70% was found in 23: shovel shape (UC, LI1, LI2, LC), double shovel (UI1, UI2, UC, LI1, LI2, LC), interruption groove (UI1, UI2, LI1, LI2), tuberculum dentale (UI1, LI1, LI2), lingual cusp number (UP1, UP2, LP1, LP2), and hipocone (UM1, UM2). 13 traits was no found in this sample: tuberculum dentale (LC), Carabelli (UM1, UM2), paraconule (UM1, UM2), metaconule (UM1, UM2), entoconulid (LM1, LM2), metaconulid (LM1, LM2), and protostilyd (LM1, LM2).

DISCUSSION

Hanihara (1968) distinguished a characteristic dental pattern in East Asia peoples: high frequencies of shovel shape (UI1), entoconulid, deflecting wrinkle, and protostilyd (LM), all of which composing the "Mongoloid Dental Complex". Some years later, Turner (1976) describe two types of Mongoloid Dental Pattern namely Sundadont (Southeast Asian populations), and Sinodont (Northeast Asian populations). The Sinodont pattern evolved among populations from Asia and Americas about 20.000 to 11.000 years ago (Aung *et al.*, 2005).

Devoto *et al.* describes high frequencies of shovel shape in UI1 and UI2 in early Atacama Indians (1967), Precolumbian Tastilian Indians (1971), and a Northwestern Argentinean population from Salta Province (1968). All his studies describe 100% of shovel shape presence in UI1 and near values for UI2 (between 70% and 99%). In other samples analyzed previously of Araucanos (Bollini *et al.*, 2006) and Chubut Region (Bollini *et al.*, 2008b) from Patagonia, and Tastil Region (Bollini *et al.*, 2008a), shovel shape presence in UI1 and UI2 is near values to the sample describe here.

Dahlberg (1947) describes high frequencies (100%) of shovel shape in several American aborigines, such Pima Indians and Pueblo Indians. They show the same percentage observed in this paper. Nelson (1938) observed in Pecos Pueblos a high frecuency too for this trait (97.80 %.); Goldstein (1948) described 100% of shovel shape for Texas Indians and Sioux. The same percentage showed Pewenches Indians from Chile (Rothhammer *et al.*, 1968).

Campusano *et al.* (1972) show a similar study on the same ethnic group (Diaguitas) with samples keep from Museo de Arqueología, La Serena in Chile. In this study, a Mongoloid and Sinodont categories is assumes by authors and a high frequency of shovel shape is describes (80%) and absence of Carabelli´s complex.

Calchaquí sample studied here is near to these values in shovel shape expression and Carabelli´s complex, but the results of this study suggest that a Sinodont pattern is no clear for this sample. This consideration can be interpreted as a reflection of possible external factors in composition of total sample size. The use of morphological traits from the human dentition can create some problems of a methodological nature when studying archeological samples minor to 15 individuals. One issue is the assumption of dental trait expression as individually immutable, in the sense of being morphologically symmetrical between homologous teeth. In bioarcheology, estimating the frequency of a dental trait is influenced by the availability of samples and limited crown wear and the absence of caries (Rodríguez-Flórez & Colantonio, 2007). Some authors recommend scoring the higher grade of expression for each dental trait (Turner & Scott, 1977) or counting both the left and right sides for each individual (Haeussler *et al.*, 1988). Frequencies finding in Calchaquí sample can be influences by a low sample size. To conclude, the present investigation provides additional, insightful elements for a biological description that can help us to identify more easily the possible biological factors in the process of dental morphologic diversification associated to regional and temporal ranges in this region of Argentina.

Table I. Dental non-metric frequencies in the sample.

Tooth type	Trait	Dichotomy	Presence	Absence	k	%
UPPER PERMANENT DENTITION						
UI1	Shovel shape	0 - 3	1 - 3	0	5	0,71
	Double shovel	0 - 4	1 - 4	0	1	0,14
	Tuberculum dentale	0 - 3	1 - 3	0	2	0,28
	Interruption groove	0 - 1	1	0	1	0,14
UI2	Shovel shape	0 - 3	1 - 3	0	5	0,71
	Double shovel	0 - 4	1 - 4	0	3	0,42
	Tuberculum dentale	0 - 3	1 - 3	0	5	0,71
	Interruption groove	0 - 1	1	0	3	0,42
UC	Shovel shape	0 - 3	1 - 3	0	4	0,57
	Double shovel	0 - 4	1 - 4	0	4	0,57
	Tuberculum dentale	0 - 3	1 - 3	0	6	0,85
UP1	Lingual cusp number	1 - 3	2 - 3	1	3	0,42
UP2	Lingual cusp number	1 - 3	2 - 3	1	3	0,42
UM1	Hypocone	0 - 3	1 - 3	0	1	0,14
	Carabelli	0 - 4	1 - 4	0	0	0,00
	Paraconule	0 - 1	1	0	0	0,00
	Metaconule	0 - 1	1	0	0	0,00
UM2	Hypocone	0 - 3	1 - 3	0	1	0,14
	Carabelli	0 - 4	1 - 4	0	0	0,00
	Paraconule	0 - 1	1	0	0	0,00
	Metaconule	0 - 1	1	0	0	0,00
LOWER PERMANENT DENTITION						
LI1	Shovel shape	0 - 3	1 - 3	0	1	0,14
	Double shovel	0 - 4	1 - 4	0	1	0,14
	Tuberculum dentale	0 - 3	1 - 3	0	1	0,14
	Interruption groove	0 - 1	1	0	1	0,14
LI2	Shovel shape	0 - 3	1 - 3	0	1	0,14
	Double shovel	0 - 4	1 - 4	0	1	0,14
	Tuberculum dentale	0 - 3	1 - 3	0	1	0,14
	Interruption groove	0 - 1	1	0	1	0,14
LC	Shovel shape	0 - 3	1 - 3	0	2	0,28
	Double shovel	0 - 4	1 - 4	0	2	0,28
	Tuberculum dentale	0 - 3	1 - 3	0	0	0,00
LP1	Lingual cusp number	0 - 3	1 - 3	0	2	0,28
LP2	Lingual cusp number	0 - 3	1 - 3	0	2	0,28
LM1	Entoconulid	0 - 1	1	0	0	0,00
	Metaconulid	0 - 1	1	0	0	0,00
	Protostilyd	0 - 1	1	0	0	0,00
LM2	Entoconulid	0 - 1	1	0	0	0,00
	Metaconulid	0 - 1	1	0	0	0,00
	Protostilyd	0 - 1	1	0	0	0,00

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BOLLINI G. A.; RODRÍGUEZ-FLÓREZ, C. D. & COLANTONIO, S. E. Rasgos dentales no-métricos en una serie Pre-Conquista "Calchaquí" de Argentina, América del Sur. ***Int. J. Morphol., 27(4)***:1063-1067, 2009.

RESUMEN: Estudiamos una muestra Pre-Conquista de Calchaquíes del Noroeste de Argentina, con el objetivo de explorar patrones de morfología dental presentes en esta población. Se realizó un análisis macroscópico en dentición permanente de 7 cráneos. 40 rasgos no-dentales fueron registrados utilizando el ASU Dental Antropology System. Porcentajes mayores al 70% fueron encontrados solamente en 4 rasgos. La muestra estudiada está cerca de valores en la expresión de la forma de pala, pero los resultados de este estudio sugieren que un patrón Sinodonte no es claro para esta muestra. Para concluir, la presente investigación brinda adicionalmente, profundos elementos para una descripción de los factores biológicos en el proceso de diversificación morfológica dental asociada a los rangos regionales y temporales en esta región de Argentina.

PALABRAS CLAVE: Asimetría bilateral; Rasgos dentales no-métricos; Muestra Pre-Conquista; Argentina.

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