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POSTER SECTIONS

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CT Imaging: Analyzing Jaw Condyle Bone Density as a Valuable Indicator for Age at Death in Archaeological Studies

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Learning objectives

The identification of attributes given by the skeleton of archaeology and anthropology presents challenges that qualitative or indirect methods show a considerable degree of standard error, both in children and mainly in adults.The main objective of the present study is the analysis of UH density values (Hounsfield Units) of individuals of known sex and age.Among other objectives: Study the density in specific regions of the mandible and temporomandibular joint (Figure 1); Creation of a database through retrospective analysis of exams already carried out, covering the...

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Background

The most frequently used techniques are based on radiation absorptiometry in bone tissue, particularly DXA, as X-ray absorption is quite sensitive to the amount of calcium in bone tissue. Quantitative measurements that can be obtained from most two-dimensional (2D) densitometric techniques include bone area (BA, cm2), bone mineral content (BMC or BMC, g), and bone mineral density. (BMD or BMD, Bone Mineral Density, g/cm2). Other techniques include Quantitative Ultrasound (qUS) and Quantitative Computed Tomography (qCT).Each technique has its advantages and disadvantages depending on the study...

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Findings and procedure details

General results are presented in table 1.[Table 1]Dispersion analysis was performed for different variables. There is a significant decrease in BMD give by H.U. from 35 to 40 years onward. While bone density alone may not provide a precise age at death, it serves as one of many indicators used in forensic and archaeological contexts to estimate the age of skeletal remains. The accuracy of age estimation methods can vary depending on factors such as the preservation of the skeletal material, the availability of reference...

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Conclusion

Estimation of age at death is a crucial research topic in anthropology and archeology and the development of reliable methods for estimating age at death in different skeletal regions increases the likelihood of identifying unknown skeletal remains. Several imaging techniques can be transposed to anthropological and/or archaeological studies; To achieve this, adapting protocols is sometimes necessary; The combination of several techniques can overcome error variation and reinforce results; Quantitative CT offers several advantages for assessing bone density compared to other imaging modalities: It provides quantitative,...

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Personal information and conflict of interest

J. Pinheiro: Nothing to disclose R. Godinho: Nothing to disclose

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References

Navega, D., Coelho, J. d. O., Cunha, E., & Curate, F. (2018). DXAGE: A New Method for Age at Death Estimation Based on Femoral Bone Mineral Density and Artificial Neural Networks. Journal of Forensic Sciences, 63(2), 497–503. https://doi.org/10.1111/1556-4029.13582Rauch F, S. E. (2001). Changes in bone density during childhood and adolescence: an approach based on bone's biological organization. J Bone Miner Res., 16(4), 597–604.Rizzoli, R., Bianchi, M. L., Garabédian, M., McKay, H. A., & Moreno, L. A. (2010a). Maximizing bone mineral mass gain during growth for...

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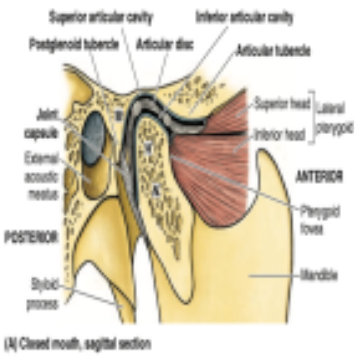

Fig 1: *Temporo-mandibular joint*

Fig 2: *Example of measurements in the axial plane.*

Fig 3: *Example of measurements in the sagital plane.*

		Unit	Min	Max	Mean	SD
Age		y	20	70	37.3	15.2
Axial Density		HU	224	1079	646	181.7
Sagital Density		HU	267	1000	670	181.7
Coronal Density		HU	295	1026	635	176.1
Condyle Lower Section	Cortical Bone	HU	723	1044	938	93.4
	Trabecular Bone	HU	198	1159	869	71.2
Condyle Middle Section	Cortical Bone	HU	382	771	670	99
	Trabecular Bone	HU	221	1098	865	70.1
Condyle Higher Section	Cortical Bone	HU	190	771	539	98.1
	Trabecular Bone	HU	234	1069	857	67.4

y: years; HU: Hounsfield Units

Table 1: *Descriptive statistics for the whole sample (n=42)*

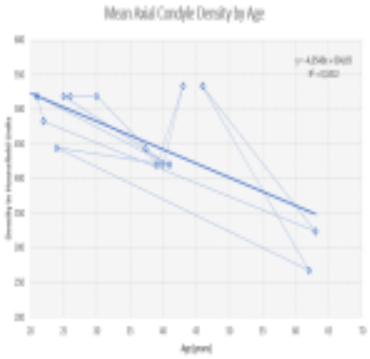

Fig 4: *Mean Axial Condyle Density by Age*

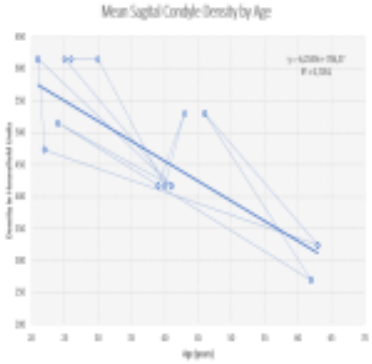

Fig 5: *Mean Sagital Condyle Density by Age*

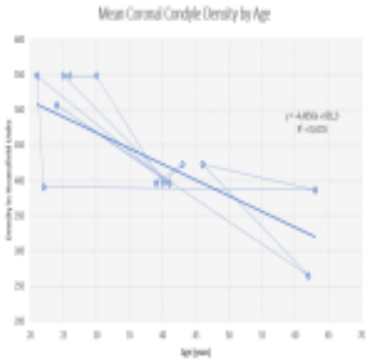

Fig 6: *Mean Corornal Condyle Density by Age*

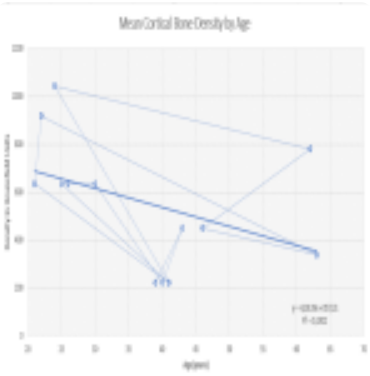

Fig 7: *Mean Cortical Condyle Density by Age*

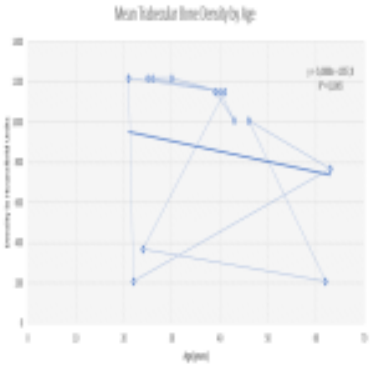

Fig 8: *Mean Trabecular Condyle Density by Age*

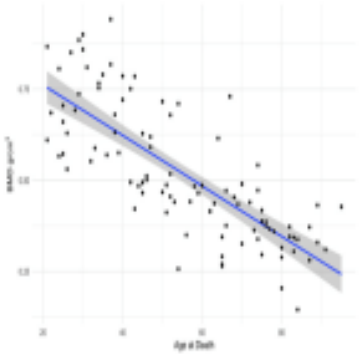

Fig 9: *Comparative analysis of BMD and Age at death*