CRANIAL VAULT THICKNESS VARIATION IN EUROAMERICANS

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The study of human cranial vault thickness (CVT) has a long history. Many researchers have examined systematic differences within and between groups to explore the effects that certain variables have on the thickness of the vault bones. This variation has been used to define the differences between populations, to clarify sexual dimorphism, to reconstruct phylogenetic relationships between species of Homo, and to explain or posit differences in behavior in intelligence and mental health. Unfortunately, this body of work is filled with contradictory and often perplexing results. Most studies have failed to control for important variables when examining variation in CVT. Often age or the presence of age-related pathological conditions go unrecorded or fail to be considered.

One aspect of the study of CVT that has not been carefully examined is variation in the three bone layers that comprise the vault: external cortical bone, diploic bone, and internal cortical bone. Of the numerous CVT studies, only two previous studies, by Lippert and Kafer (1974) and Angel and Evans (1971), have examined the thickness of each vault layer and their contribution to overall vault thickness. Both of these studies are problematic due to small sample sizes or unclear methodologies. A detailed examination of the individual layers in addition to the total thickness of the vault bones may help to clarify the significant variation observed prior to research.

This study examines a sample of 108 Euroamerican male and female cadavers from Indiana and New York, ranging in age from 47 to 102 years. Age, sex, and the presence of hyperostosis frontalis interna (HFI) were recorded for each specimen. CVT was measured at four locations, including the right and left frontal and parietal eminences. The extraction of bone cores at each of these landmarks allowed for measurement of three individual layers of the vault. The cores were examined using low-powered (10x) microscopy and the resulting data were analyzed with univariate statistics and analysis of covariance (ANCOVA). All HFI sample cores were examined again at 22.5x magnification to qualitatively assess Hershkovitz et al.'s "global model," which posits that in HFI the internal table progressively differentiates into three separate layers.

Results show that SEX and HFI are significant factors in the expression of CVT. AGE and the interaction between SEX and HFI, however, were insignificant. Females expressed greater total thickness and diploic thickness, whereas males exhibited greater cortical bone thickness, especially in the internal cortical layer. The increase in CVT due to HFI was expressed in both the internal cortical layer and the diploic bone. This study concludes that although some evidence for the global model was observed, the differentiation of the internal table in HFI does not occur at the frequency that Hershkovitz et al. reported.

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