

Characterizing neurocranial shape in microcephalic children.

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Microcephaly has come to the forefront of discussion in physical anthropology in light of the hominid findings from Flores, Indonesia. Because the clinical term "microcephaly" describes a symptom rather than a disorder, any of a variety or combination of causes may underlie the phenotype. This ambiguity makes characterizing a generalized "microcephalic shape" difficult, and existing literature on the topic is scarce.

By examining a sample of modern clinical cases, this study attempts to define specific morphometric traits that are shared among children clinically diagnosed with microcephaly. Three-dimensional coordinate landmark data collected from computed tomography scans of microcephalic children and age-matched unaffected children are analyzed using multiple quantitative techniques: 1) differences in cranial shape are explored using Euclidean Distance Matrix Analysis (EDMA), 2) Levene's tests are used to compare variance between groups, and 3) cranial base flexion is compared using t-tests.

Microcephalic children have a relatively shorter and narrower cranial base than unaffected children, and show a significantly higher variance in these dimensions. Additionally, measures of neurocranial height are more variable in microcephalic individuals than in their unaffected counterparts. Despite these differences, the angle of cranial base flexion does not differ significantly between the two groups. These characters, along with more traditional cranial metrics, such as circumference, volume, and cranial indices, enable a quantitative evaluation of the microcephalic cranial phenotype. We discuss the implications of these results for interpreting the human fossil record.

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