VARIATION IN CRANIAL BASE FLEXION AND CRANIOFACIAL MORPHOLOGY IN MODERN HUMANS

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Abstract

Cranial base flexion has been used extensively as a baseline or standard from which to interpret differences in craniofacial growth and morphology. Lateral cephalometric radiographs of 414 adults representing seven samples from around the world were compared for variation in cranial base and facial morphology. The samples represent Australian Aboriginal, New Zealand Maori (Polynesian), Thai, Chinese, white American, African Sotho/Xhosa/Zulu and African Khoi/San populations. Seven angles of cranial base flexion, five craniofacial angles and nine cranial base and facial dimensions were measured on tracings of lateral cephalometric radiographs.

Numerous significant correlations were found between cranial base flexion angles, craniofacial angles and dimensions of the cranial base and craniofacial skeleton. A positive correlation was found between the orientation of the foramen magnum, clivus and the anterior cranial base, with a negative correlation between these angles and the orientation of the hard palate. There was also a parallel relationship between the orientation of the foramen magnum and the anterior cranial base (measured from pituitary point to nasion). Cranial base flexion, craniofacial angles and dimensions differed significantly between some samples. Despite this, there was no evidence of distinct facial types between samples. Multivariate statistics revealed some discrimination between some samples for dimensions; however, if angles were used alone, less than 50% of individuals could be correctly assigned to their sample of origin. Most of the variation could be attributed to variation between individuals, rather than variation between samples.

The range of variation in cranial base flexion is considerable, and needs to be taken into account when comparing samples. Flexion of the cranial base is generally insufficient to distinguish people from different geographic samples. The functional and evolutionary significance of the relationship between the orientation of the foramen magnum and cranial base flexion is discussed for its potential usefulness as a reference line for interpreting craniofacial morphology.

Statement

This work contains no material which has been accepted for the award of any other degree of diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

I give consent to this copy of my thesis, when deposited in the University Library, being available for loan and photocopying.

Signed:

Date:

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