

MA Thesis – Human Skeletal Biology Track, Physical Anthropology - New York University
(2008)

EFFECTS OF HABITUAL ACTIVITY PATTERNS ON MODERN HUMAN ELBOW MORPHOLOGY: A
COMPARISON OF ELBOW JOINT SIZE AMONG FOUR MODERN HUMAN POPULATIONS AND
HOMO NEANDERTHALENSIS

Habiba Chirchir

Abstract

Size related measurements were made on distal humeri and proximal ulnae of 145 modern human populations to determine the effects of activity patterns on elbow morphology. The first hypothesis was that, Neanderthals have larger elbows than modern human populations and can therefore sufficiently used to understand the divergence between *Homo sapiens* and *Homo neanderthalensis*. These data were compared to Neanderthal data on elbow joint size. The second hypothesis was that, populations engaging there arm muscles intensily will have large and robust elbow joints whereas, populations loading their elbow joints to a lesser extent bear smaller joint size. The elbow joint employs an array of muscles resulting in pronation, supination, flexion, and extension. Measurements were done on both articular and epiarticular surfaces of the joint quantifying breadth, and length of the epicondyles, fossae, capitular, and pillars. Data was collected on both forensic and historical samples from Africa, North America, and Australia. To address the firs hypothesis, linear regressions were run to determine the relatedness of adjusted size measures and their geometric means among all human groups and Neanderthals. It revealed presence of strong correlations between capitular depth and biepicondylar breadth while, all ulnae measurements do not show a strong correlation.

For the second hypothesis, principal component analyses were used to define the relationship between the categories of modern humans and the activities they engage in. There was a strong genetic signal amongst sub-Saharan Africans than between groups performing similar activities. The lack of clear correlations of measurements indicating effects patterns of strain corresponding to muscular motion may imply strains acquired in adulthood are not quite marked. Also, genetic signals and ontogenetic strains are rather key in interpreting strain patterns. Likewise, using elbow joint morphology may not be sufficient to support the differentiation between Neanderthals and anatomically modern humans.

