H8 The Relationship Between Bone Weight and Age at Death

Emily J. Loucks, BA, University of Tennessee, 250 South Stadium Hall, Department of Anthropology, Knoxville, TN 37996; and Brannon I. Jones, MA, University of Tennessee, 250 South Stadium Hall, Department of Anthropology, Knoxville, TN 37996*

The goal of this presentation is to determine the relationship between bone weight and age at death in skeletons from the William M. Bass Donated Collection.

This presentation will impact the forensic community and/or humanity by aiding in the age estimation of unidentified remains and the separation of commingled remains.

Bone weight has been studied intermittently with various approaches and goals. Previous studies have utilized skeletons with various taphonomic histories and bone conditions. Researchers have used bones from anatomical collections, fresh cadavers, and naturally skeletonized individuals. Due to differences in histories, the conditions of the bones have varied from dry but still greasy, dry and mechanically degreased, and dry and naturally degreased. These studies have compared relationships between individual bones within a single skeleton, whole skeletal weight and age, individual bone weight and age, and the effects of disease. In addition, the differences in ancestral groups, male and female individuals, left and right sided bones, and weight bearing versus non-weight bearing bones have been studied.

The sample employed in this study is approximately 400 white males and females 20 to 100 years of age from the William M. Bass Donated Collection at the University of Tennessee. Note was made of obese individuals and those with chronic illnesses and disease. Each of the skeletons shares a common taphonomic history, including decomposition at the Anthropological Research Facility and processing. Most of the individuals decomposed on the ground surface of a wooded environment; however, several individuals decomposed in shallow burials. Processing included removal of soft tissue and simmering in hot water.

For each of the skeletons, the following bones were weighed in grams with a digital scale: clavicle, scapula, humerus, radius, ulna, os coxae, sacrum, femur, tibia, and fibula. The left and right were both measured for all paired bones. Individual bones exhibiting pathology or orthopedic devices that may affect weight were excluded. Measurements of each bone were used to control for size. For example, in the humerus, the maximum length, epicondylar breadth, and maximum diameter of the head were used.

The relationship between bone weight and age at death was analyzed by performing regression analysis and producing correlation coefficients for several variables. A test for independence was executed for each bone in order to determine that bone weight was not dependent on size. Once independence was determined, the relationship between age and weight for each bone was analyzed in four separate groups: male left, male right, female left and female right. In addition, the relationship between age and each entire limb was examined. Preliminary results show that for the humerus, weight and size are independent of one another. A significant inverse relationship was found between age and weight for both males and females, although the relationship was stronger for females. Males and females both showed a higher correlation between age and weight in the left humerus than the right humerus, which may be related to handedness. Similar results are expected for the other arm bones; however, the weight bearing bones of the pelvis and lower limbs may not show such a strong correlation.

While this study is preliminary and not capable of aging an individual from bone weight, it is hoped that further research will allow weight to be used in combination with other techniques to estimate age at death. With the complexity and confusion of some current aging techniques, the prospect of simply weighing a bone or combination of bones and narrowing in on an age at death makes this and future research worthwhile.

Bone Weight, Human Variation, Age at Death

 ** Presenting Author*