H84 A Comparison of Age-Related Macroscopic Traits of the Ilium and Sacrum

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After attending the presentation, attendees will have a better understanding of age-related traits of the auricular surfaces of the ilium and sacrum in terms of age-at-death indicators

This presentation will impact the forensic science community by demonstrating potential differences in the development of three macroscopic traits of the auricular surfaces of the sacrum and ilium as well as the potential significance for estimating age-at-death from these structures.

Accurate age-at-death estimation from human skeletal remains is critical for establishing a comprehensive and forensically significant biological profile of an unknown individual, which in turn facilitates the victim identification process. While many regions of the human skeleton have methods to facilitate adult age estimation, the auricular joint of the pelvis presents a unique structure to compare similar traits across the sacrum and ilium. Interestingly, while both the sacrum (Passalacqua) and the ilium (Lovejoy et al., Buckberry and Chamberlain, Osborne, among others) have age-at-death estimation methods, there has been little work relating the adult degenerative changes which occur on the paired auricular surfaces.[1-4] In fact, Lovejoy et al. state: "The sacral [auricular surface]...does not reflect the age changes described below [in regard to their method of scoring the ilium] and cannot be used to determine age."[2] This presentation tests that assertion.

The primary aim of this study was to assess three degenerative traits (apical changes, microporosity and macroporosity) found on both the sacrum and ilium auricular surfaces and compare the timing of appearance for each trait across the auricular joint. Paired ilia and sacra from the Hamann-Todd (n=380) and Bass (n=234) collections comprise the samples used in this study. Individuals from the Hamann-Todd collection consist of males and females, mainly of African and European ancestry, ranging in age-at-death from 10 to 96 years and individuals from the Bass collection consist of males and females of European ancestry, ranging in age-at-death from 16 to 97 years. Previous research (Lovejoy et al.; Passalacqua) found no significant sex or ancestry differences in regard to age-related changes of the ilium or sacrum.[2,1]

These traits develop over a continuum and each morphological character was scored according to multiple trait variants as described in Passalacqua and Buckberry and Chamberlain.[1,3] However, in order to limit observer error and deal with discrepancies in method scoring procedures, these traits were re-scored on a presence or absence scale (1 and 0, respectively). A Kruskal-Wallis test was then used to assess differences in presence and absence of these traits between the ilium and sacrum. Results suggest that macroporosity appears earlier and more often in the ilium (mean age = 50.65) than the sacrum (mean age = 53.8 years, $\chi^2 = 82.926$, df = 1, *p-value* = 0.000). However, apical change ($\chi^2 = 2.145$, df = 1, *p-value* = 0.143) and microporosity ($\chi^2 = .464$, df = 1, *p-value* = 0.496) show no significant difference in presence or absence frequency.

While Lovejoy and colleagues may have failed to recognize corresponding traits appearing on the sacral auricular surface, our results suggest similar ages of onset for microporosity and apical changes. However, much of the auricular changes of the ilium are more subtlety expressed on the sacrum, likely as a function of thicker cartilage covering the sacral auricular surface (Schunke).[5] While the etiology of macroporosity on the auricular surfaces is unclear, overall it was found in much greater frequency on the auricular surface of the ilium. This could be a function of the degeneration of the ilium's cartilage due to the thinner cartilage covering that portion of the auricular joint; however, further research is required to investigate the cause.

References:

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