H105 Sexual Dimorphism in Argentinean Populations: A New Approach

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After attending this presentation, attendees will gain a better understanding of the expression of sexual dimorphism in Argentinean populations, as well as to explore a new methodological approach for the examination of inter-group differences

This presentation will impact the forensic science community by contributing to knowledge of the nature and magnitude of sex variation in Argentinian populations. These results will affect the way in which anthropologists interpret sex differences from the skeleton.

The assessment of sex is the first analysis performed on an unknown skeleton. Due to different environmental and genetic factors, the osteometric proportions of a skeleton vary significantly within and between populations. Thus, it is not possible to devise universal formulae and standards for evaluating sexual dimorphism. Population specific standards need to be constructed for each group, not only for improving forensic analysis, but also for establishing a better understanding of the patterns of sexual dimorphism. Generally, males are larger and more robust than females. However, researchers have yet to determine which suite of measurements express the greatest amount of sexual dimorphism in the human skeleton.

The purpose of this research is two-fold. Firstly, to obtain population specific standards for an Argentinean population using discriminant function analysis (DFA). Secondly, to explore the idea that if allometry is statistically detected and describes the shape variable which covaries with size, then explanations may be found in terms of growth and biomechanics. Once these patterns are found in one population, several comparisons of sexual dimorphism can be made between populations. From a methodological perspective, differences between sexes can be analyzed through DFA, and as shown in this research, by principal component analysis (PCA).

The sample is comprised of 124 unidentified adult skeletons (64 female and 60 males) which were exhumed from cemeteries in the Buenos Aires area by the Argentinean Forensic Anthropology Team (EAAF). Sex was ascertained through DNA, though positive identifications are still pending. The skeletons were buried between the years of 1976 and 1979.

Standard anthropometric post-cranial measurements were taken and collected in a database. Variables selected through DFA were examined to explain their contribution to sexual dimorphism (females/males). In particular, whether they were expressing merely sex size dimorphism (SSD) or true sex differences in developmental patterns.

Univariate discriminant functions were constructed using direct methods for each of the metric measurements. Multivariate discriminant functions were developed for each bone using a stepwise procedure for all the dimensions.

When using univariate discriminant function, the breadth measurements from all the bones had the highest percentages of correct classifications. The humerus yielded four measurements with correct classification higher than 90%. When using multivariate discriminant functions, all elements within the study show correct classifications higher than 94%.

On the other hand, when pooled groups were analyzed through PCA, only one component was obtained. The traditional interpretation of PCs indicates that the main differences between sexes are size differences (SSD); this result is also supported by DFA. When eliminating the differences between groups, the differences within groups are expressed. Both DFA and PCA by group show that within-group allometric patterns are masked when using pooled groups. Group size differences often result in spurious correlations when multiple variables are considered. Therefore, the more size dimorphic variables enter both the PC1 and DF. This research shows that PC1 is including size, allometric shape, and also size free shape. From a geometric point of view, PCA and DFA are doing very
similar things.

Among the Argentinean sample, DFA detected overall size disparity between the sexes rather than differences in allometric patterns, even though the latter do exist. When comparing populations, it is necessary to assess whether the group differences are related to allometric patterns or solely raw size.

Discriminant Function Formula, Principal Components Analysis, Allometry

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