



## Physical Anthropology Section - 2014

### H104 A Comparison of the Klales *et al.* (2012) and Phenice (1969) Methods of Sex Estimation on a Modern Colombian Sample

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After attending this presentation, attendees will be able to compare and contrast the sex estimation methods outlined in Klales *et al.* with those of the Phenice method, as well as evaluate the application of these methods to a non-European American population sample.<sup>1,2</sup> Attendees will be presented with a comparison of results obtained by the application of both methods on the Antioquia Modern Skeletal Reference Collection, a documented modern sample housed in Medellin, Colombia.

This presentation will impact the forensic science community by providing data on the application of a new method of sex estimation developed by Klales *et al.* on a Colombian sample, and its efficacy in comparison to the widely used Phenice method.

Klales *et al.* modifies the Phenice method by expanding the scoring scheme and incorporating statistical analysis to provide a probability that an individual is male or female. It is posited in this presentation that the Klales *et al.* method might be more suitable for forensic cases where testimony in a court of law is necessary; however, it does not perform better than the Phenice method when applied to a modern Colombian sample.

Sex estimation is an important component of the biological profile during analysis of human skeletal remains. The Phenice method of sex estimation is based on the scoring of three distinct pelvic traits known as the ventral arc, subpubic concavity, and ischiopubic ramus, as feminine (1), masculine (3), or ambiguous (2), with the final determination of sex dependent on the average score obtained. This limited scoring system does not represent the variation exhibited by individual males and females, as most individuals do not exclusively exhibit the traits of one sex. Thus, sex estimation using the Phenice method is often reliant on professional opinion and experience. Klales *et al.* expand the scoring system, allowing a possible five scores for each of the three pelvic traits. The scores of each pelvic trait are plugged into a logistic regression equation that produces a weighted score, which is then used to generate a probability. The sectioning point of the weighted scores is 0, with negative scores having a higher probability of being female and positive scores having a higher probability of being male. The two methods were tested on a sample of 50 individuals (39 male, 11 female) from the Antioquia Modern Skeletal Reference Collection curated in Medellin, Colombia. The sample age-at-death ranged from 17 to 99-years-old, with an average age of 49.9-years-old.

Results show a significant difference in overall accuracy rates for both methods (66% for Klales *et al.*, 82% for Phenice). The Klales *et al.* method resulted in a 45% accuracy rate for females and 72% accuracy for males. Using the Phenice method, accuracy rates were 78% for females and 83% for males. Three individuals were scored as ambiguous when using the Phenice method. In these cases, two out of three individuals were correctly assigned using the Klales *et al.* method. In the instances where Klales *et al.* provided incorrect sex estimation but Phenice was correct, a tendency for the Klales *et al.* method to score male individuals as female was noted.

These results suggest that the Phenice method is preferable to the Klales *et al.* method, though in cases where the pelvic scores are ambiguous, the Klales *et al.* method proves useful. Both methods yielded higher accuracy rates for males; however, this may be attributed to the uneven sex distribution in the sample, with males far outnumbering females. More research is needed to determine the validity the Klales *et al.* method and the degree to which it improves upon the Phenice guidelines. A larger and more evenly distributed sample would more accurately represent the applicability of the Klales *et al.* method. Future testing in Colombia is necessary as more documented females become available.

#### References:

1. Klales AR, Ousley SD, Vollner JM. A revised method of sexing the human innominate using Phenice's nonmetric traits and statistical methods. *J Forensic Sci* 2012;149:104-14.
2. Phenice TW. A newly developed visual method of sexing the Os Pubis. *Am J Phys Anthropol* 1969;30:297-302.

#### Sex Estimation, Forensic Anthropology, Colombia