



Physical Anthropology Section - 2013

H8 Sex Estimation Using Non-Metric Traits in Thai Crania With the Walker (2008) Method

Madeline Roth, BA*, Merychurst Univ, Dept of Applied Forensic Sciences, 501 E 38th St, Erie, PA 16546; Stephen D. Ousley, PhD, Mercyhurst College, Dept of Applied Forensic Sciences, Dept of Anthropology, 501 E 38th St, Erie, PA 16546; and Panya Tuamsuk, MD, Khon Kaen Univ, Dept of Anatomy, Faculty of Medicine, Khon Kaen, THAILAND

After attending this presentation, attendees will: (1) be informed about the current research into sex estimation in the Thai; and, (2) understand the reasons why population-specific methods of non-metric sex estimation are important.

This presentation will impact the forensic science community by demonstrating that a commonly used North American method may not perform well when applied to other populations, and by furthering the research into sex estimation in the Thai.

Non-metric methods of sex estimation are widely used by forensic anthropologists across the world because of their ease of application and usefulness on fragmentary remains. Recently, statistical techniques such as discriminant function analysis have been applied to several well-established non-metric trait scoring systems in order to increase their classification accuracy and reliability, as well as make them admissible in court under the *Daubert* standards. It is also important that population-specific methods of sex estimation be developed, as patterns of sexual dimorphism vary extensively worldwide.¹⁻³ A method that accurately separates sex in one population may not be as effective in a population that is very different morphologically. There has been little effort to develop non-metric methods to estimate sex in the Thai or other Southeast Asian groups, and those that have been developed lack the integration of statistical methods necessary for reliability.

A non-metric method of estimating sex from crania that is commonly utilized in North America was published and developed using samples of African and European Americans, American Indians, and English.⁴ In this study, Walker's method was applied to a sample of 70 males and 26 females from the Kohn Kaen University Hospital in Kohn Kaen, Thailand. Walker's reported logistic discriminant functions were applied to the Thai sample to test their performance. Next, in order to describe differences between the Thai sample and Walker's samples, the means of the samples were compared using Wilcoxon's rank-sum test, and the trait distributions of Walker's samples were compared to the Thai sample using the Freeman-Halton test. Univariate statistical analysis was run using each of Walker's five cranial traits to determine each trait's usefulness in estimating sex in Thais. The Thai sample was also classified through linear discriminant function analysis, using FORDISC 3.1.⁵ Finally, the Thai sample was classified with logistic discriminant function analysis.

Results showed that Walker's method is not suitable for use in Thai populations. When Walker's logistic discriminant functions were applied to the Thai sample, their performance was very poor, exhibiting consistently low classification accuracies and high sex biases. In some cases, these functions produced classification accuracies of less than 50%, which is less accurate than random assignment of sex. Wilcoxon's test and the Freeman-Halton test indicated that there were significant differences in trait score means and distributions between the Thai population and Walker's reference samples. In certain traits, the Thai male sample was significantly different from Walker's male samples, while not significantly different from Walker's female samples. When linear discriminant function analysis was used on the Thai sample, classification rates were consistently lower than those obtained in Walker's study. Using logistic regression derived from the Thai sample did not improve results. Throughout this study, no analysis produced a classification accuracy greater than 80% in the Thai sample.

Walker's method should not be used on the Thai, and must be used with great caution in untested populations as its results may be invalid. Patterns of sexual dimorphism in the Thai are different enough from those seen in Walker's samples that the equations developed by Walker do not effectively classify the Thai by sex. All analyses using Walker's traits performed poorly, even when newly calculated using the Thai as a reference sample; this indicates that Walker's system is not useful for estimating sex in the Thai, due to a lower degree of sexual dimorphism in these traits. New systems utilizing different traits should be explored in order to find those that may be the best for estimating sex from Thai crania.

References:

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Sex Estimation, Non-Metric Traits, Southeast Asia