



A160 Sex Differences From Ridge Density in Palm Prints: A Preliminary Study

Tanuj Kanchan, MD*, Kasturba Medical College, Department of Forensic Medicine, Light House Hill Road, Mangalore, 575 001, INDIA

After attending this presentation, attendees will be able to recognize that the ridge density in the palm prints exhibit sexual dimorphism in Indian population.

This presentation will impact the forensic science community by recognizing the sexual dimorphism of the ridge density in palm prints that may be used in identification of dismembered human remains in cases where an individual hand is recovered and brought for examination. It can give vital evidence in identification of the perpetrator of the crime in cases where the prints left behind at a crime scene.

Although researchers have attempted sex determination from fingerprint ridge density, the sex differences from the ridge density in palm prints remain unreported. No systematic studies are available on the sex differences from ridge density in palm prints worldwide are available at this time. This preliminary study is done to evaluate the sex differences from ridge density in palm prints and study its usefulness in discriminating sex in Indian population using statistical considerations.

The present prospective research was conducted on 131 young adults (73 males and 58 females) at the Department of Forensic Medicine, Kasturba Medical College, Mangalore, India. Healthy individuals aged between 20-25 years were included in this study after taking informed consent. The subjects with any disease, deformity, injury, fracture, amputation, or history of any surgical procedures of the hand were excluded from the study. Each subject included in the study was asked to wash their hand clean with soap and water. A clean plain glass plate was uniformly smeared with black duplicating ink with the help of a roller. The subjects were asked to apply their hand on the smeared plate and then transfer them on to a white paper. Regular pressure was applied on the palm area to obtain the palm prints. A 5 mm x 5 mm square was drawn on a transparent film and placed on the obtained palm print samples in the areas to be analyzed. In order to measure ridge density, or the number of

ridges in a given space, the count was carried out diagonally on a square measuring 5 mm x 5 mm. The epidermal ridges were counted with the help of a hand lens. This count represents the number of ridges in 25 mm square area and reflects the ridge density value. The ridge density value was similarly obtained individually from the four designated areas on the palm prints that are commonly encountered at the crime scene. The four designated areas included; central prominent part of the thenar eminence (P1), parathenar region inner to the proximal axial triradius (P2), medial mount proximal to the triradius of the 2nd digit (P3), and lateral mount proximal to the triradius of the 5th digit (P4). The data obtained was analyzed statistically using SPSS (Statistical Package for Social Sciences, version 11.0) computer software. The male female differences in ridge density were analyzed individually for each of the designated areas from the palm prints. Ridge density was compared between right and left sides for each of the designated areas. Statistical significance was defined at the standard 0.05 level.

Mean ridge density was significantly higher in females than males in the designated areas except for P3 area in the right hand. No right-left differences were observed except for the P4 area in females. For all the areas taken together the mean ridge density was 11 ridges/25 mm² in males and 12 ridges/25 mm² in females for the right and left palm prints. The likelihood ratio (LR) was calculated to obtain the probability inferences of sex, based on ridge density values. Posterior probabilities were calculated using Bayes' theorem and information obtained from both LR computations and posterior probabilities were used to show favoured odds. The present research reveals that females have greater ridge density hence, finer ridge details than males in Indian population. The mean ridge densities thus, can be used as a presumptive indicator of sex of an unknown print left at a crime scene.

Sex Determination, Ridge Density, Palm Prints