

Kertas Asli/Original Article

**Stature and Sex Estimation Using Foot Measurements for
Malays and Chinese in Malaysia**

(Penentuan Ketinggian dan Seks Menggunakan Ukuran-ukuran Kaki bagi
Melayu dan Cina di Malaysia)

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ABSTRAK

Kajian ini dijalankan untuk membentuk formula demi menganggar ketinggian tubuh badan dan menentukan jantina dengan menggunakan panjang dan lebar kaki. Seramai 150 orang subjek yang berumur 20-30 tahun diambil dari Universiti Kebangsaan Malaysia Kampus Kuala Lumpur (UKMKKL). Subjek tersebut adalah Melayu (45 lelaki dan 45 perempuan) dan Cina (30 lelaki dan 30 perempuan). Ketinggian, panjang dan lebar kaki diukur menggunakan alatan antropometrik dalam ukuran milimeter. Hasil statistik menunjukkan bahawa pelbagai ukuran kaki kanan dan kiri tidak mempunyai perbezaan yang signifikan (Panjang kaki/FL: $t(298) = -0.235, p = 0.815$; Lebar kaki/FW: $t(298) = 0.932, p = 0.352$). Perbezaan yang signifikan pada semua ukuran pula dapat dilihat pada jantina (Tinggi/S: $t(148) = 12.550, p < 0.05$; FL: $t(148) = 11.692, p < 0.05$; FW: $t(148) = 8.321, p < 0.05$). Bagi kaum, ketinggian tubuh badan kaum Cina adalah lebih tinggi berbanding kaum Melayu secara signifikan ($t(148) = -3.103, p < 0.05$) tetapi tiada perbezaan yang signifikan diperhatikan pada ukuran kaki (FL: $t(148) = 0.002, p = 0.999$; FW: $t(148) = 1.362, p = 0.175$). Korelasi yang paling tinggi telah ditunjukkan antara ketinggian tubuh badan dengan panjang kaki pada semua kumpulan. Analisis Regresi Garis Lurus dan Regresi Berganda telah digunakan untuk membentuk formula menganggar ketinggian tubuh badan. Walau bagaimanapun, didapati formula yang dibentuk dari Regresi Berganda adalah lebih tepat kerana kombinasi panjang dan lebar kaki menghasilkan korelasi koefisien yang lebih tinggi dalam semua formula ($S = 585.298 + (4.898 \times FL) - (1.453 \times FW)$, $F(2,149) = 149.324, p < 0.01, R^2 = 0.670$). Formula untuk penentuan jantina juga telah dibina menggunakan Analisis Pokok Klasifikasi. Keputusan menunjukkan ketepatan untuk menentukan jantina seseorang adalah di antara 86.3-87.5% bagi perempuan dan 85.2-85.7% bagi lelaki dengan menggunakan panjang kaki manakala di antara 68.4-76.8% bagi perempuan dan 77.8-81.0% bagi lelaki dengan menggunakan lebar kaki.

Kata kunci: Ketinggian, jantina, panjang kaki, lebar kaki, antropologi forensik

ABSTRACT

The aim of this study was to develop formulae for stature and sex estimation using foot length and foot width. A total of 150 subjects ranging in age from 20 to 30 years were recruited from Universiti Kebangsaan Malaysia Kampus Kuala Lumpur (UKMKKL). The subjects were Malays (45 males and 45 females) and Chinese (30 males and 30 females). Stature, foot length and foot width were measured using anthropometric instruments in millimetres. Statistical analysis indicated that bilateral variation of various lengths was insignificant for all the foot measurements (Foot length/FL: $t(298) = -0.235, p = 0.815$; Foot width/FW: $t(298) = 0.932, p = 0.352$). Sex differences were found to be highly significant for all the measurements (Stature/S: $t(148) = 12.550, p < 0.05$; FL: $t(148) = 11.692, p < 0.05$; FW: $t(148) = 8.321, p < 0.05$). Stature was highly significant in Chinese rather than Malay ($t(148) = -3.103, p < 0.05$) but no significant differences were found in all the foot measurements (FL: $t(148) = 0.002, p = 0.999$; FW: $t(148) = 1.362, p = 0.175$). The highest correlation was found between stature and foot length in all groups. Linear and Multiple Regression Analysis were used to develop formulae for stature estimation. However, the latter was found to be more accurate as the correlation coefficient was highest in the combination of foot length and foot width in all the formulae ($S = 585.298 + (4.898 \times FL) - (1.453 \times FW)$, $F(2,149) = 149.324, p < 0.01, R^2 = 0.670$). Formulae for sex estimation were obtained by using the Classification Tree Analysis. Result had indicated that sex estimation formulae can help to determine the sex with 86.3-87.5% accuracy in females and 85.2-85.7% accuracy in males by using foot length while the accuracy is 68.4-76.8% in females and 77.8-81.0% in males by using foot width.

Keywords: Stature, sex, foot length, foot width, forensic anthropology