

Stature and Knee Height: Correlational Study in Latvian Elderly Population

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Introduction. In clinics, determination of human stature is important in calculating BMI, body surface area for various treatments, creatinine clearance, energy need, left ventricle mass index etc. Performing exact measurements is difficult in elderly individuals, especially those who are bed-bound, individuals with contracture, advanced arthritis or amputations. Yet, an equation for height prediction from anthropometrical measurements in population of Latvia is insufficient. It may be also used by medico-legal experts for generating data for identification from dismembered body parts. Such formulae have been determined for different ethnic and racial groups in many countries, e.g. the USA and Japan; however, these may be not applicable to the Latvian population.

Aim. The aim of the study is to formulate specific equations which could be used to estimate stature in elderly Latvians both by knee length only and knee length and age.

Material and Methods. The study was performed in both residents and non-residents of nursing homes during 2013–2014. The stature and knee height for both legs was measured in 128 males and 433 females aged 65–99 by anthropology laboratory nurses using portable anthropometer GPM (precision ± 0.1 cm). Knee height measurements were taken in a sitting position by positioning the knee and ankle at a 90 degree angle. Those with amputation or musculoskeletal disease and fractures in history were excluded. After exclusion data of 86 males and 197 females aged 65–94 remained. In cases of length disparity, the highest measurement was taken. The data was analyzed by SPSS-22. To estimate stature univariate and multiple regression, analysis was carried out.

Results. The stature ranged between 139.5–176.6cm, mean 155.8 ± 7.0 cm in females and 155.0–182.4 cm, mean 169.9 ± 6.2 cm in males, the height of knee varied in females from 42.5 to 56.5 cm, mean 49.8 ± 2.5 cm and 47.50–59.9 cm, mean 53.9 ± 2.5 cm in males. Knee height statistically significantly predicted stature both in males and females: for males $F(1.84) = 177.8$, $p < 0.0005$, $R^2 = 0.679$ from equation $60.90 + 2.02 * \text{knee height (cm)}$; for females $F(1.195) = 335.4$, $p < 0.0005$, $R^2 = 0.632$ from equation $43.62 + 2.25 * \text{knee height (cm)}$. Knee height and age statistically significantly predicted stature both in males and females: for males $F(2.83) = 96.4$, $p < 0.0005$, $R^2 = 0.699$, from equation $72.12 + 1.98 * \text{knee height (cm)} - 0.119 * \text{age}$; for females $F(2.195) = 207.1$, $p < 0.0005$, $R^2 = 0.681$, from equation $66.42 + 2.12 * \text{knee height (cm)} - 0.21 * \text{age}$.

Conclusions. In elderly Latvian population male stature can be estimated with 67.9% probability from knee height and 69.9% – from knee height and age, but in female with probability 63.2% from knee height and 68.1% – from knee height and age. We propose that a further study for prediction of weight and BMI from anthropological measurements is needed.