Abstract

In biomechanical analyses, the position of long bone cross-section under study is defined relatively to biomechanical length (BML) of the bone. In damaged bones where BML can not be measured, the position of the cross-section has to be estimated. Sládek et al. (2010) studied the effect of inaccurately located femoral and tibial midshafts on the cross-sectional parameters in a pooled-sex sample from a single period. In the present study we aim to test whether the effect of inaccurately located femoral and tibial midshafts on the cross-sectional parameters is sample-specific and/or sex-specific.

We used femora of 29 females and 25 males and tibiae of 24 females and 36 males from two different periods (Late Eneolithic and Early Bronze Age; early modern period). 29 cross-section CT scans per bone obtained at each 1% interval from 40% to 60% of BML and at each 5% interval from 20–40% and 60–80% of BML were available to us. We digitized the cross-section scans and computed the error ranges of the cross-sectional parameters. We compared the mean percentage difference (MD%) and mean accuracy range (MAR) between samples and sexes.

Our results are in concordance with the results of Sladek et al. (2010): the cross-sectional parameters most sensitive to positioning error are tibial second moments of area (MAR = 11–14 mm) and tibial polar second moment of area (MAR = 18–22 mm). The error ranges of cross-sectional parameters were not significantly different between samples and sexes. Thus, we conclude that the effect of inaccurately located femoral and tibial midshafts on the cross-sectional parameters is neither sample-specific nor sex-specific.

Key words

biomechanical analysis, demaged bones, cross-section, error range, cross-sectional parameters, femora, tibiae