

Comparison between dual-energy X-ray absorptiometry and anthropometric predictive equations in assessing percentage body fat in soccer players with lower limb amputation

Valentina Cavedon, Carlo Zancanaro and Chiara Milanese

Università di Verona, Dip. di Neuroscienze Biomedicina Movimento, Verona, Italia

Anthropometric equations are an accessible and cost-effective method to assess percentage body fat (%BF) in different athletic populations, but their reliability in athletes with limb amputation is unclear [1]. The aim of this study was to compare, in amputee soccer players, %BF estimated with several commonly used equations and dual-energy X-ray absorptiometry (DXA) taken as the reference method. Body density was assessed in 10 male soccer players aged 33.9±11.9 years with transfemoral (n=7) or transtibial (n=3) lower limb amputation using five currently used anthropometric equations established for able-bodied subjects [Durnin and Womersley (1974), Jackson and Pollock 7-sites (1978), Sloan and Weir (1970), Wilmore and Behnke (1969), and Katch e McArdle (1973)]; body density was converted to %BF according to Siri (1961). %BF measured with DXA (Hologic) was used for assessing the validity of anthropometric equations (paired-sample t-test); the agreement between methods was assessed with the coefficient of determination and the standard error of estimate. Results showed that all the anthropometric equations significantly underestimate %BF (-2.7%÷-6.0 %; p, 0.012÷<0.001), but the Durnin and Womersley equation, which significantly overestimates %BF by +4.0%. The highest adjusted coefficient of determination was found for the Wilmore and Behnke equation (R²=0.805, p=0.001) and the lowest (R²=0.422, p=0.025) was found with the Durnin and Womersley equation. The standard error of estimate ranged from 2.37% (Wilmore and Behnke equation) to 4.08% (Durnin and Womersley equation). Further comparative studies are required to confirm or refine the accuracy of practical, non-invasive methods for monitoring %BF in the amputee athletic population. Impairment-specific equations may be needed in amputee soccer players with lower limb amputation.

References

- [1] Willems et al. (2015) Dual-Energy X-Ray Absorptiometry, Skinfold Thickness, and Waist Circumference for assessing Body Composition in ambulant and Non-Ambulant Wheelchair Games Players. *Front in Physiol.* 6:356

Key words

Anthropometry, soccer, amputee, body composition.