

Assessment of Fat Mass Index and Fat-free Mass Index

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Introduction. Fat mass (FM, kg) and percentile body fat (%BF, %) commonly is used as assessment tool, especially to evaluate nutrition status in children (Kyle et al., 2001). As body mass index is linked with height, it is possible to calculate fat mass index (FMI, kg/m²) and fat-free mass index (FFMI, kg/m²). Then body composition parameters can be evaluated, linked with height (Baumgartner et al., 1998; Kyle et al., 2003). Height-independent body composition parameters (FMI, FFMI) allow height-independent interpretation of nutrition status (Eissa et al., 2009). Fat-free mass increases with age in adolescents by growing and maturation. FMI or FFMI can be used to assess changes in fat-free mass with growth: whether there are changes due to shorter height or to changes in body composition.

Aim, Materials and Methods. The data presented was gathered as part of health check-ups by specially-trained medical team of the State Sport Medicine Centre from 2008 to 2012. The study population comprised 6048 young athletes (4249 boys and 1799 girls) aged 10–17 years from a representative mix of urban and rural areas and sports disciplines throughout Latvia. During the study period, 13,788 measurements were taken (9813 on boys and 3975 on girls). The athletes represented 27 sports divided into three groups according to weight control practices (Sundgot-Borgen et al., 2013): group I, weight-class sports in which short-term weight control practices are used; group II, aesthetic sports in which leanness is preferred; and group III, weight control is not highlighted.

Height was measured to the nearest 0.1 cm with a ultrasonic height meter (UHM-101, Korea) with children standing in bare feet. Body mass and total body fatness was measured using multi frequency 8-polar bioelectrical impedance leg-to-hand analyser or body composition analyser (X-Scan plus II, Korea). The subjects were required to adhere to standard BIA testing guidelines, given in the manufacturer's manual and measured in light clothes.

Results. Mean of FFMI vary from 17.33 kg/m² at 10 years of age to 19.52 kg/m² at 17 years of age for males in group I; from 16.44 kg/m² to 18.51 kg/m² in group II; and from 16.77 kg/m² to 19.05 kg/m² in group III, accordingly. Mean of FFMI for female vary from 15.73 kg/m² to 17.17 kg/m² in group I; from 14.20 kg/m² to 16.07 kg/m² in group II; and from 15.30 kg/m² to 16.50 kg/m² in group III, accordingly.

Mean of FMI in young male athletes vary from 5.84 kg/m² at 10 years of age to 4.57 kg/m² at 17 years of age for males in group I; from 4.02 kg/m² to 3.69 kg/m² in group II; and from 4.59 kg/m² in group III, accordingly. According to female young athletes population, FMI vary from 8.69 kg/m² to 7.59 in group I; from 6.40 kg/m² to kg/m² in group II, and from 7.63 kg/m² to 7.37 kg/m² in group III, accordingly.

Conclusions. Developed assessment scales of FMI and FFMI for young athletes can be used in daily practice to prevent negative consequences on health instead of body mass index.