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Body composition as a determining factor in the aerobic fitness and physical performance of Czech children

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Abstract

Body composition (BC) may be used as a criterion of the actual biological state of children, in other words, their physical state of development. The aim of our study was to determine the interdependence of some body composition variables and aerobic fitness ($VO_{2max.kg^{-1}}$) and parameters of physical performance, ie. calculated total work (CTW) and maximal power output (MPO) on the treadmill in a group of Czech children and youth. The interdependence between frequently used indicators of aerobic fitness ($VO_{2max.kg^{-1}}$, CTW, and MPO), and BC (% BF, FFM, BCM and ECM/BCM) were studied in a group of 1235 Czech children (756 boys and 479 girls) aged from 6 to 14 years. Both aerobic fitness and physical performance variables were assessed by means of an incremental treadmill test with a constant slope of 5%. The age dependent initial speed was increased by $1 km.h^{-1}$ till subjective exhaustion. Body composition was determined by whole body bioimpedance measurements using a modified prediction equation for children. The percentage of BF was negatively correlated with $VO_{2max.kg^{-1}}$, and CTW. Both FFM and BCM were positively related to CTW, MPO, and $VO_{2max.kg^{-1}}$. The ECM/BCM relationship was negatively related to $VO_{2max.kg^{-1}}$ and CTW. In conclusion, BC is an important determinant of physical performance in the laboratory (treadmill exercise tests) and in the field (running and/or walking tests). The BC parameters significantly influence the variables that could be used for characterisation of aerobic fitness. The results further demonstrate that when oxygen consumption is not feasible, physical performance characteristics together with parameters of BC seem to be a good predictor of aerobic fitness. This may be very helpful in large population studies.

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