Skeletal muscle oxygen uptake in obese patients: functional evaluation by knee-extension exercise.

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We hypothesized, in a group of obese women (OB), a more significant impairment of aerobic metabolism during knee extension (KE) exercise vs. that described during cycle ergometer exercise, lending support to the role of skeletal muscles in limiting exercise tolerance in OB. Eleven OB (age 29.5 ± 5.5 years, body mass index 43.2 ± 5.4 kg m^2) and 10 non-obese controls (CTRL) women were tested. Fat-free mass of a lower-limb (FFM_{LL}) was assessed by a densitometer. Heart rate (HR) and pulmonary O_2 uptake (VO_2) were determined during incremental exercise tests to voluntary exhaustion carried out on a custom-built KE ergometer and on a cycle ergometer (CE). FFM_{LL} and maximal isometric force of KE muscles were higher in OB vs. CTRL (+42.4 and +46.2 %, respectively). Peak work rate was significantly lower in OB (-18.4 %) vs. CTRL in CE, but not in KE. Expressed in mL min^{-1}, peak VO_2 was not different in OB vs. CTRL in CE and in KE. After it was divided per unit of FFM involved in the exercises, peak VO_2 was significantly lower in OB vs. CTRL, both for CE (-19 %) and KE (-33 %). Expressed per unit of exercising muscle mass, peak oxidative function is impaired in OB. The impairment is more pronounced after limitations related to cardiovascular O_2 delivery are reduced. In OB muscle hypertrophy and the increased muscle force allow to preserve exercise tolerance during aerobic exercises carried out by relatively small muscle masses.