Quadriceps muscle function characteristics in severely obese and nonobese adolescents.

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The purpose of this cross-sectional study was to compare quadriceps muscle strength and fatigue between severely obese (body mass index 34 kg/m^2) and nonobese adolescents. Maximal isokinetic torque and angle of peak torque as well as isometric torque at short (40° of knee flexion) and long (80° of knee flexion) muscle length were measured using an isokinetic dynamometer. Muscle fatigue was quantified as the percent torque loss during an isokinetic voluntary protocol and an electrical stimulation isometric protocol. Obese adolescents produced greater absolute isokinetic (+16%; *P*<0.05) and isometric torque at short (+25%; *P*<0.01) but not at long muscle length (>0.05) compared to their lean counterparts. The angle of peak torque was significantly lower in obese than in nonobese subjects (-11%; *P*<0.05), i.e., obese produced their maximal strength at shorter muscle length. Isokinetic and isometric torque normalized to the fat-free mass were not significantly different between the two groups. No significant difference in voluntary and stimulated torque loss was observed between groups. Muscle strength per unit of fat free mass and muscle fatigue were similar in the obese and nonobese adolescents tested in this study, therefore suggesting that obesity has little or no effect on quadriceps muscle function characteristics. On the other hand, it remains to be confirmed whether the observed quadriceps muscle length specificity contributes to the reduced functional capacity of obese adolescents during complex motor tasks involving deep knee lexion (squatting, kneeling).