

Influence of gender, age and BMI on lower limb muscular power output in a large population of obese men and women

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Objective: to depict the general trends of muscle anaerobic performance in obese subjects within a wide range of age and body weight.

Design: cross-sectional study for the measurement of lower limb maximal anaerobic power output with a modification of the Margaria stair climbing test in a large population of obese subjects of both genders within a wide span of age (18-80 y) and body mass index (BMI, 30-68 kg m⁻²). Furthermore, body composition was also determined by bioimpedance analysis in a representative subgroup, in order to evaluate the relationship between fat-free mass (FFM) and power output.

Subjects: a total of 1298 obese subjects (486 males, 812 females) from an Italian population seeking medical support for body weight reduction. Within this sample, a consistent subgroup of 193 subjects (59 males, 134 females) was also selected for accessory study of body composition.

Results: in general, male subjects developed significantly higher lower limb power output (\hat{W}) than female subjects ($p < 0.001-0.01$), both in absolute terms and per unit body mass. In both genders, \hat{W} was influenced negatively by age ($p < 0.001$) and positively by BMI ($p < 0.001$). While the effect of age was similar in both genders, BMI had a different positive effect in male and in female subjects, being more definite in male subjects. In the subgroup, FFM was found to depend both on age and BMI, in a fashion comparable with that displayed by \hat{W} . The gender-related differences in \hat{W} disappeared when expressed per unit FFM and a significant linear correlation was found between FFM and \hat{W} , both in male and female subjects ($R^2 = 0.32 - 0.51$, $p < 0.001$).

Conclusions: the lower limb maximal power output is significantly higher in obese male subjects than in female subjects, being negatively influenced by age but positively related to BMI. Female subjects appear to be at a greater disadvantage for effect of obesity, the major motor limitations being suffered by older women with higher BMI. These gender differences in age- and BMI-dependent \hat{W} changes seem to be related to changes in FFM in the subgroup in whom body composition was studied.

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