

Energy cost and cardiovascular response to upper and lower limb rhythmic exercise with different equipments in normal-weight and severely obese individuals.

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Aims: The purpose of the study was to assess energy expenditure and cardiovascular response to rhythmic activity with 6 machines exercising different arm and leg muscle groups in normal-weight (NW) and obese (OB) individuals.

Methods: In 16 extremely OB subjects and 15 NW controls, oxygen uptake (VO_2), heart rate (HR), blood lactate (LA) concentration and ratings of perceived exertion (RPE) were determined during submaximal rhythmic exercise at different intensities obtained by increasing the frequency of the movement (FOM) with each machine. Peak VO_2 (VO_{2p}) for each equipment was determined with incremental tests up to exhaustion, whereas maximal VO_2 was estimated at cycle ergometer.

Results: Net energy cost (Enet) of exercise increased ($p < 0.001$) for effect of FOM, in both NW and OB with all equipment. Enet was higher in OB than NW during submaximal exercise with Chest/Back, Shoulder Press/Lat Pull, and Leg Press. Higher VO_{2p} were attained with lower limbs than with upper limbs, in both NW ($p < 0.001$) and OB ($p < 0.001$). At the same VO_2 (relative to maximal), HR, LA and RPE were similar in NW and OB but higher during arm than leg activity ($p < 0.001$), while at the same VO_2 (relative to VO_{2p}) no difference was detected.

Conclusion: Enet of rhythmic exercise is higher in OB than NW with machines requiring wide displacement of large body segments. For both NW and OB, physiological responses and RPE are importantly affected by the relative activation of involved muscles. LA concentration is an important determinant of RPE, independent of the limb in activity.

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