


A Comparison Between Ventilation and Heart Rate as Indicator of Oxygen Uptake During Different Intensities of Exercise

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ABSTRACT

The aim of this study is to compare the relation between ventilation (V_E) and oxygen uptake (VO_2) [$VO_2=f(V_E)$] and between heart rate (HR) and VO_2 [$VO_2=f(HR)$]. Each one of the subjects performed three types of activities of different intensities (walking without load, walking with load and intermittent work). VO_2 , V_E , and HR were measured continuously by using indirect calorimetry and an electrocardiogram. Linear regressions and coefficients of determination (r^2) were calculated to compare the relation $VO_2=f(V_E)$ and $VO_2=f(HR)$ for two different regroupings: by session duration (r^2_{session}) and by subject (r^2_{subject}). Results showed that r^2_{session} of the relation $VO_2=f(V_E)$ were significantly higher than those of the relation $VO_2=f(HR)$ for steady state activities (walking with or without load during 3 or 6 min, $p < 0.01$) and for activities without oxygen consumption steady state (walking with or without load during 1 min, $p < 0.01$ and intermittent work, $p < 0.05$). V_E is more strongly correlated with VO_2 than with HR. This is a very promising approach to develop a new method to estimate energy expenditure.

Key words: Physical activities, light to moderate intensities, steady state activities, non-steady state activities.

Key Points

- Ventilation is more strongly correlated with oxygen uptake than heart rate during physical activities of different intensities.

- This study shows the interest to looking for ventilation to estimate energy expenditure.
- This study is a promising approach to develop a new method to estimate energy expenditure
- An interesting perspective could be to develop a light and portable device to measure ventilation based on the coupling of four magnetometers.

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