

Energy Expenditure and Economy During a Cycle Ergometer Test

Franklin, E.L., Crise R.S., Brooks, K.A. Louisiana Tech University, Ruston, LA

Research has shown that submaximal cycle ergometer testing presents a reduced $\dot{V}O_{2\max}$ score when compared to that of the treadmill test. In this study, we compared a submaximal economy test on the Monark Cycle Ergometer. The purpose of this study was for each participant to perform the same test and compare economy, $\dot{V}O_2$ ml/kg/min for a given workload, as well as calories burned between males and females during the nine minute test. By testing economy for each participant, we aim to determine whether males or females use oxygen more efficiently during testing. Before beginning the test, the Cosmed metabolic equipment was calibrated. The test was standardized to last for nine minutes at 70 rotations per minute and 1 kilopond of resistance. Based off of the comparison in $\dot{V}O_2$ mL/kg/min and kCal mL/kg/min, the women had the highest $\dot{V}O_2$ per given workload and also had the lowest calories burned. The women were the least efficient by having a higher $\dot{V}O_2$ while working at the same intensity as the male participants. The research used to support this study indicates that there are two components for overall metabolic power during a dynamic leg exercise on the cycle ergometer; the power used to overcome the resistance applied to the ergometer and the rate of energy expenditure required to move the lower limbs without opposition against the opposition load (Girardis, Linnarsson, Moia, Pendergast, & Ferretti, 1999). It is also stated that during exercise at submaximal levels below lactate threshold the net $\dot{V}O_2$ of the whole body is equivalent of the net rate of energy expenditure (Storer, Davis, & Caiozzo, 1990). The cycle ergometer is a good use to determine $\dot{V}O_2$ by collecting expired air and the volume measured in the spirometer (Saltin & Astrand, 1967). For the results of this lab to be more accurate the resistance and intensity could have been changed at different stages of the test. This would have given and more accurate measure of the ability of each participant to reach the next stage of testing.