



News

Upper Body Ergometry: The Most Underused Aerobic Exercise

By Joseph M Warpeha, MA, CSCS, NSCA-CPT

Aerobic exercise usually involves activities that incorporate large muscle groups, are cyclic and rhythmic in nature, and last longer than a few minutes in duration. Naturally, the pieces of equipment that come to most people's minds when thinking about an aerobic workout are treadmills, stationary bikes, elliptical machines, etc. The common denominator of these types of aerobic exercise is significant lower body involvement. This should not be a surprise to anyone since our legs are designed for exactly the purpose of moving heavy loads (i.e. our own weight) for prolonged periods. For many people, however, exercise involving the lower extremities is problematic due to injury of the knees, feet, ankles, or hips. The solution for these people as well as those injury-free individuals who are looking for some variety in their training is the most underused aerobic exercise: upper body ergometry or arm crank ergometry.

Arm cycling involves sitting upright in a seat and "pedaling" with the arms. Upper body ergometry involves nearly every upper body muscle group with particular emphasis on the arms and shoulders. Of course, this mode of exercise requires access to an upper body ergometer (UBE) which many health and fitness facilities do not currently have (see figure 1). Historically, upper body ergometry has been almost exclusively used by paraplegics since they could remove the seat from the machine and perform the arm cranking from their wheelchair.

Oftentimes, the only people who regularly use an UBE are paraplegics and triathletes. Obviously, triathletes understand the importance of aerobically training the upper extremities for the swim portion of the triathlon. Why shouldn't everybody incorporate some degree of upper body aerobic exercise into their routine? It is true that an elliptical machine involves the upper body. However, the handles will move even if your hands are not on them, meaning the legs are actually performing a significant amount of the work. A rowing machine has a significant upper body component, but may not be possible for those with lower body limitations.

The proper body position for the UBE is to first set the seat height so that your shoulders are at the same level as the axis of rotation of the crank. Second, the seat should be moved horizontally so that when your arms are furthest from your body in the cranking cycle, the arms are not quite fully extended (maybe a 5–10° bend at the elbow). The most comfortable hand position typically is a neutral grip (palms facing). The initial intensity and duration will be significantly less than what you would do on a stationary bike or elliptical machine. Perhaps 50 watts for 10 minutes would be a good starting goal. Most will find even this is quite difficult. This is to be expected since the upper body musculature is so much smaller, weaker, and less efficient (mechanically) compared to the lower body¹. However, if you train the upper body aerobically, you will improve with time just as you would with any other progressive overload routine with resistance or aerobic exercise.

For those who train based on heart rate (HR), you will find that initially you will not be able to get your heart rate into your normal target range. The main limitation will be muscular fatigue at first, but this will improve with time. Many will argue that it is impossible to get HR values using an UBE anywhere near the same levels as those achieved with lower body modalities.

Table 1 illustrates an ongoing case study examining the differences in performance and physiological variables among four different aerobic exercise modalities. It is the author's contention that you can get a quality aerobic workout on an UBE if you push yourself and are patient for a couple of months while your upper body adapts (when the case study first started 17 months ago, the 30-minute HR average on the UBE was only 144 bpm). Also, your torso and midsection will get a good workout due to the large amount of stabilization required.

Table 1. Case study of a 29 year-old male: intensity and heart rate values achieved during various aerobic exercise modalities after 17 months of training (April 2004 – August 2005).

Mode/Exercise	Frequency (per week)	Intensity/Workload (30-min average)	30-min HR Average† (beats per minute)	Peak HR † (beats per minute)
Outdoor Running (4.1 miles)	2	8.7 mph	186	196
Upright Bike	1	250 watts	185	198
Recumbent Bike	1	250 watts	185	200
UBE	1	160 watts	184	198

†Average and peak HR values obtained from a heart rate monitor

So, if you have injuries that preclude you from doing lower body activities or you are looking to add variety to your routine, you may just want to challenge yourself a little and try the UBE. Or maybe you just want a muscle- and joint-specific warm up modality to use for 5 minutes at a low intensity prior to an upper body resistance training session. Either way, you will never know if you don't give it a go.

Medical Note: Upper body aerobic exercise has been shown to cause significantly greater increases in exercise blood pressure than lower body aerobic exercise (1). People with known or suspected cardiovascular disease (hypertension, etc.) should seek the advice of a licensed physician before beginning any program involving upper body aerobic exercise.

Reference

1. McArdle WD, Katch FI, Katch VL. (1996) *Exercise physiology: Energy, nutrition, and human performance*, (4th ed) Baltimore: Williams & Wilkins.

About the Author

Joe Warpeha is an exercise physiologist and strength coach and is currently working on his PhD in exercise physiology at the University of Minnesota-Minneapolis. His current research focuses on bone and tendon adaptations to training and the effects of skeletal loading on their physiological and mechanical properties. Joe teaches several courses at UM including "advanced weight training and conditioning" and "measurement, evaluation, and research in kinesiology". He has a master's degree in exercise physiology and certifications through the NSCA, ACSM, USAW, ASEP, and YMCA. He has over 12 years of resistance and aerobic training experience and has been a competitive powerlifter since 1997. Joe is a two-time national bench press champion and holds multiple state and national records in the bench press while competing in the 148, 165, and 181-pound weight classes. (1/5/2006)
