

Effect of Combined Electrical Stimulation as a Recovery Modality on Selected Physiological Transients in Adolescent Judo Players

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Abstract

The study was conducted on 14 Haryana state level junior judo players to find out the effectiveness of Russian current stimulation as a recovery modality following exhaustive exercise on heart rate, temperature, blood lactate and blood pressure. Each subject was asked to do 20-m shuttle run test until exhaustion for three times with one week gap in between. After shuttle test, each subject underwent the following three recovery interventions, between 3-33 min, in a systematic random order. Recovery I: passive recovery where the subject was asked to sit for 33 minutes. Recovery II: active recovery where the subject was asked to walk/run at 60% maximal heart rate (MHR) between 3-33 minutes. Recovery III: electrical stimulation where the subject received Russian current (50 hz, 10 sec on: 50 sec off) for 5 min i.e. 3rd to 8th min and 18th to 23rd min of recovery with interspersed 10 min rest in between. Heart rate, temperature, blood lactate, systolic blood pressure, diastolic blood pressure was recorded before the shuttle test and 3rd, 8th, 18th, 23rd and 33rd minutes of recovery period. ANOVA repeated measures (with- in subjects) was used to see the effect of electrical stimulation on physiological parameters in different timings and ANOVA (between subjects) to compare the electrical stimulation with active and passive recovery. Significant level was set at '0.05' ($p < 0.05$). Results showed electrical stimulation produced increased heart rate but not significantly, when compared to passive recovery but significantly less when compared to active recovery. Russian current also significantly increased the blood lactate level when it compared to both active and passive recovery values at regular intervals. Active recovery produced significantly lesser body temperature and lactate as well as significantly higher systolic blood pressure when compared to both passive and electrical stimulation modalities. It is concluded that electrical stimulation results in increased blood lactate production without much changes in other physiological parameters.

Keywords: Russian Current, Blood Lactate, Heart Rate, Blood Pressure, Shuttle Run

Introduction

Surface neuromuscular electrical stimulation (NMES) is a useful treatment tool in sports medicine apart from treating other clinical conditions such as stroke, cerebral palsy, and spinal cord injury.

NMES protocols consist of a combination of pulse parameters and time modulations to induce muscle contractions that aim to simulate both endurance and resistance training (*Binder-Macleod and Synder-Mackler, 1993; Dudley et al, 1999; Bax et al, 2005; Delay et al, 2005*).

In humans, transcutaneous chronic electrical stimulation sessions can increase muscle oxidative capacity, capillarisation of fast twitch fibers, or induce some fiber type transitions among type II fiber sub types (*Cabric et al, 1987; Gauthier et al, 1992; Thériault et al, 1996; Perez et al, 2002*). Traditionally Russian current has been used to strengthen individual muscles; however *Perez et al (2003)* reported in their study that low intensity current does improve the delta efficiency of muscle at high sub-maximal work load without improving endurance performance in normal healthy