Relationship between Blood Lactate, Load and Load Volume in Weight Lifters

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Abstract

The purpose of this study was to observe the relationship between effects of different workload and load volume (i.e. 3 RM, 6 RM, 9 RM) of power clean on blood lactate production in female weight lifters. A total of six weight lifters with mean age, height and weight of 20.5 ±2.8 years, 161± 6.5cm and 70±7.4Kg respectively volunteered to participate in this study. Each subject's blood lactate was measured at rest and after 3RM, 6RM & 9RM with the help of a digital portable lactate analyzer (Lactate Scout) and the data were analyzed using Mean ±SD, T-test and correlation (Pearson).The maximum mean of relative absolute and %percent increase of blood lactate was 8.7±2.3mmol and 370.0±109.3% (3RM) followed by 7.4±2.0mmol & 349.8±112.0% (6RM) and 5.33±1.96mmol &33.3±81.3% (9RM).The difference in blood lactate at rest and after the execution of different work load volume was statistical significantly ($p < .05$). Insignificant correlation was found between the load lifted, load volume and posttest blood lactate in 3 RM, 6 RM and 9 RM. But when the data of different work load volume pattern was pooled together, there was a statistical significant negative correlation between load volume, posttest blood lactate ($r = -0.63$, $p<.01$), relative absolute ($r = -0.61$ $p<.01$) and percent increase in blood lactate ($r = -0.57$, $p<.05$). It was concluded that the blood lactate response depends upon the maximum absolute load lifted by the weight lifters as compared to the volume of load lifted. In other words, we can say that blood lactate production was largely dependent on the percentage of 1RM lifted.

Key words: Lactate, 1RM, Power clean

Introduction

Glycolysis is the conversion of glucose to pyruvate in order to generate ATP. The process primarily occurs in the cytosol, where glycolytic enzymes are in abundance. Sixteen steps of this process have been identified and the primary enzymes involved in this process are phosphofrucktokinase (PFK), phosphate dehydrogenase, and lactate dehydrogenase (LDH) *(Brooks et al., 2005).* One fate of pyruvate is oxidation that can yield additional ATP. This process also takes place in the mitochondria, where pyruvate is converted to acetyl CoA. Acetyl CoA enters Kreb's cycle to be oxidized to carbon dioxide. Eventually, ATP is formed as electrons are transferred to oxygen. This process is known as aerobic respiration *(Bergeron, 1991).* Under very high energy demands, the NADH and H^+ must be converted to NAD^+ to allow glycolysis to continue. In this situation the available pyruvate is reduced to lactate to facilitate the rapid regeneration of NAD^+ and the continued rapid production of ATP via glycolysis. This process facilitates continuous glycolysis but results in less ATP generation and increased lactate production *(Wassermann et al., 1986).* The interaction between fast and slow glycolysis is a major determinant of human