BLOOD LACTATE RESPONSE TO FOREARM SPECIFIC EXERCISE IN ROCK CLIMBERS

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Purpose

Many climbers and coaches recognise forearm fatigue as a major limiting factor of performance. Blood lactate measurements are an established tool in sports such as running, swimming and rowing to monitor training and predict performance. However, the relevance of blood lactate testing for rock climbers is uncertain. Investigators have found levels of circulating blood lactate during high intensity climbing to be in the range 4-6 mmol/l and have postulated a significant contribution from the forearms. However, the size of the finger flexor muscles relative to other prime movers in climbing suggests that this may not be correct. The aim of this research was to investigate whether blood lactate concentrations seen in climbing could predominantly be due to the forearms and hence whether blood lactate testing during climbing has the potential to be used as a useful tool for monitoring training and predicting performance.

Method

Fifteen male (25.4 ± 6.5 years, mean age ± S.D) rock climbers with the ability to regularly climb without preview (onsight) in the range of 7b – 8a were assessed using an overhanging indoor climbing ergometer with horizontal wooden rungs 2 cm wide. The subjects performed repetitions of 5s double hand contraction followed by 2s single hand contraction on the same rung with the feet remaining stationary in contact with the ergometer. Exercise continued until volitional fatigue. A discontinuous protocol was implemented using climbing angles of 20, 25 and 30 degrees from the vertical. Intact whole blood was collected via thumb prick and analysed using Analox PGM7 prior to and 1 min after each exercise.

Results

All subjects reported the inability to maintain grip as the reason for terminating the exercise. The mean blood lactate concentration was less than 2 mmol/l. There was no significant difference in blood lactate at different angles, $p < 0.05$, (2.1 ± 0.3, 1.9 ± 0.2, 1.9 ± 0.3 mmol/l, mean and S.D, increasing angle respectively). Significant difference existed in climbing time to volitional fatigue $p < 0.05$, between 20 and 30 degrees overhanging (7.47 ± 1.52min, 3.56 ± 0.75min, mean and S.D, respectively).

Conclusion

This research shows that the contribution by the finger flexors to blood lactate seen in climbing is probably too small and therefore would be unreliable if used to either assess training status of the fatiguability of the finger flexors or prediction of performance during whole body climbing. We contend that the cause of fatigue in this case was due to acidosis, but that as hypothesized, the small mass of the finger flexors contribute very little lactate to the blood stream even when acidodic. Due to these findings it may be prudent to assume a fatigue and performance monitoring relationship with blood lactate sampling only when large primary movers are being tested. Grip strength fatigue due to acidosis does not appear to be measurable with whole blood lactate sampling.