

The Relationship Between Catecholamines and Lactate Concentration in Response to Exercise in Adolescents with Obesity

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ABSTRACT

Epinephrine is a catabolic hormone that increases metabolism through glycolysis and glycogenolysis. During exercise, accelerated glycogen and glucose breakdown is associated with increased lactate production. Previous studies show obesity (OB) decreases the epinephrine response during exercise potentially affecting glucose metabolism and lactate production. **PURPOSE:** To compare the epinephrine and lactate responses in adolescents with OB and adolescents with normal weight (NW) and to determine if changes in epinephrine and lactate concentrations are associated. **METHODS:** 12 adolescents with OB (9.2 ± 1.2 y, $39.9 \pm 6.8\%$ body fat) and 12 adolescents with NW ($17.5 \pm 4.6\%$ body fat) completed an intermittent cycling protocol (ten 2-min bouts with 1-min rest in between). Blood samples were obtained at rest pre-exercise (PRE) and immediately post-exercise (IP) and blood was measured for epinephrine and lactate using enzyme-linked and colorimetric assays. **RESULTS:** There was a blunted epinephrine response in adolescents with OB when compared to adolescents with NW (OB= 36.77 ± 4.65 vs 58.30 ± 35.87 pg/mL, $p= 0.507$; NW= 40.69 ± 4.65 vs. 147.23 ± 35.87 pg/mL, $p= 0.003$). Lactate increased in both groups (1.72 ± 0.42 vs. 4.14 ± 1.69 mmol/L, $p<0.001$). Percent change of epinephrine was lower in adolescents with OB vs. those with NW (57.3 ± 10.6 vs. 204.8 ± 56.7 %, $p=0.014$). There was a trend towards statistical significance in a lower percent change for lactate in adolescents with OB vs. those with NW (112.3 ± 10.5 vs. 183.5 ± 42.7 %, $p=0.066$). Adolescents with OB showed no association between the change in epinephrine and the change in lactate. **CONCLUSION:** Increased epinephrine increases glycogenolysis and glycolytic rate, which produces more lactate as a byproduct of anaerobic metabolism. Because adolescents with obesity still had an increase in lactate with a blunted epinephrine response, there is likely another mechanism contributing to the increase in lactate.