Acute exercise leads to increased HbA1c and fructosamine levels in athletes with type 1 diabetes

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Introduction

In patients with type 1 diabetes, exercise has not consistently been shown to improve glycemic control, as measured using HbA1c levels. Participation in competitive sports may even worsen glycaemic control. Free radicals and oxidative stress markers are known to increase during acute exercise in parallel to decreased circulating antioxidant concentrations.

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Objective

We aimed to analyze the effects of chronic and acute exercise on circulating HbA1c and fructosamine levels.

Materials & Methods

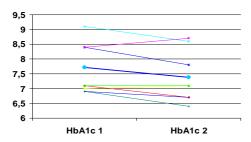
We evaluated 6 patients (5 men and 1 woman). Their mean age was 41.8 (range: 22-49). Their mean diabetes duration was 11.3 years (range: 5-20). All of them were under intensive treatment before the study (4 with MID and 2 with ISCI). Prior to the training period, they usually ran 35 Kms three days every week, which increased to 70-80 Kms five days per week during the training period. We analyzed their HbA1c and fructosamine levels before and after the training period and also before and after running a half-marathon (20 Kms).

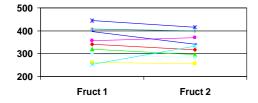
HbA1c was determined using HPLC (reference range: 4.1-6.2%, Intra and interassay coefficients of variation were 0.7% and 0.74% respectively). Fructosamine was determined by spectrophotometer (normal values ≤285 µmol/l) Intra and interassay coefficients of variation were 1.7% and 3.9% respectively.

Results

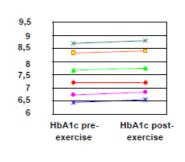
After eight months training, mean HbA1c decreased from 7.80% (CI 95%: 6.80-8.79) to 7.55 % (CI 95%: 6.52-8.57) (P: 0.13) and mean fructosamine levels decreased from 370.5 μ mol/I (CI 95%: 311.87-429.12) to 350 μ mol/I (CI 95%: 292.97-407.02) (p:0.075). Paradoxically, after acute exercise, mean HbA1c increased from 7.53% (CI 95%: 6.54-8.52) to 7.61% (CI 95%: 6.61-8.51) (p: 0.025) in parallel to raised fructosamine levels from 348.3 μ mol/I (CI 95%: 298.1-398.5) to 363.8 μ mol/I (CI 95%: 318.3-409.2) (p: 0,046).

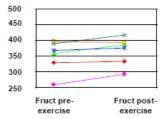
Changes in HbA1c and fructosamine (fruct) after training period





Changes in HbA1c and fructosamine (fruct) levels after running half-marathon





Conclusion

Acute exercise should be taken into account as one of the factors influencing HbA1c variability in a short time.

References

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