The influence of dietary vitamin A supplementation on vitamin A and insulin levels in sedentary or physically trained rats

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Abstract

Male rats of Wistar strain (n = 48) were fed a vitamin A deficient diet for 3 days of adaptation period and then a 10 day experimental period to reduce slightly the body stores of this vitamin. Half of the animals were subjected to physical training and/or oral vitamin A supplementation. Four different doses of supplementation were used – 0, 7.5, 15 and 60 \( \mu \text{g/d/rat} \), which is equivalent to 0, 25, 50 and 200 IU of vitamin A, respectively. Animals from the defined groups ran on a treadmill with a rate of 2.0 m/s for 15 minutes per day for 10 days. After overnight fasting, the rats were sacrificed, and insulin in blood serum and hepatic retinol concentrations were estimated. Daily feed intake and daily body gains were similar in groups of sedentary and physically trained rats. A moderate level of oral Vitamin A supplementation (the highest supplemented dose was about 6 x the above recommended NRC level) did not cause any changes in these zootechnical parameters. Oral Vitamin A supplementation resulted in an increase in retinol concentration in the liver (\( F = 15.2, p < 0.001 \)), but without significant difference between trained and untrained animals. Physical training of rats caused a statistically significant decrease of insulin concentration in blood serum (\( 1.53 \pm 0.18 \text{ vs. } 1.73 \pm 0.20 \)). This difference was highly significant (\( F = 11.1, p < 0.001 \)). Vitamin A supplementation was found not to influence the concentration of this hormone, which is responsible for energy metabolism regulation in the body. Based on estimated parameters, the necessity of vitamin A excessive use in physically trained subjects was not proven.

Key words: vitamin A deficiency, retinol, physical training, insulin, rat

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