EFFECTS OF EXERCISE ON CONTRACTILE PROPERTIES OF SKELETAL MUSCLE IN HYPOTHYROID RATS

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A THESIS SUBMITTED TO THE GRADUATE SCHOOL IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN PHYSIOLOGY

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experimental period. Evidence for a hypothyroid state was confirmed by determination of the circulating levels of thyroid hormones (triiodothyronine, T3 and thyroxine, T4). The marked depressions of serum T3 and T4 concentrations were observed in hypothyroid and exercise - hypothyroid groups. When compared with controls, hypothyroidism produced 9.37% and 12.79% reductions in body weight and weight gain, respectively. In addition, the muscle weights of both soleus and plantaris obtained from hypothyroid group were significantly lesser than control whereas there was no significant difference in normalized weight (mg/100 g BW). In exercise group, weight gain during exercise period (from the 7th to 12th week) was about 5.5%, significantly lower than control. A reduced weight gain in exercise group might be associated with a decrease in food consumption. No evidence of skeletal muscle hypertrophy was observed subsequent to exercise training.

The contractile properties of the soleus and plantaris were separately examined by stimulating sciatic nerve. In both muscles, the absolute twitch tensions (g) were decreased in hypothyroid group as compared with control, however, no significant difference was observed when expressed as normalized twitch tension (g/g tissue). Endurance training did not affect the twitch tension of the muscles. Hypothyroidism caused the alteration in contractile speed. Both time to peak tension (TPT) and one - half relaxation time (1/2 RT) increased in hypothyroid soleus while only 1/2 RT was prolonged in hypothyroid plantaris. Endurance training caused the prolonged 1/2 RT in both soleus and plantaris muscles. However, 1/2 RT of trained - hypothyroid muscles seemed to be decreased when compared with that of hypothyroid alone. The developments of tetanic tension (normalized for weight) of soleus and plantaris as estimated by force - frequency curve were depressed in hypothyroid state. In contrast, trained - plantaris and soleus demonstrated the significant increase in tetanic tension at all stimulating frequencies. In addition,