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HYPERTROPHY OF THE RAT PLANTAR FLEXORS FOLLOWING EIGHT WEEKS OF VOLUNTARY HINDLIMB RESISTANCE EXERCISE

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PURPOSE

A study was conducted to determine the effect of voluntary resistance exercise regimens on the mass of the soleus, plantaris, and gastrocnemius muscles that comprise the rat plantar flexors.

METHODS

Using a custom-designed hind limb loading apparatus, 15 week old male Sprague-Dawley rats were operantly conditioned to enter a vertical tube, insert their head into a neck ring, and repeatedly lift and lower a 700-g load using a “beel raise” movement that targeted the plantar flexors. The effect of duty cycle (2 or 5 sessions per week) was studied on the mass of the soleus, plantais, and gastrocnemius muscles after 8 weeks of exercise. Age-matched sedentary rats were used as controls. Upon completion of the exercise regimen, the rats were sacrificed and the individual muscles were removed and immediately weihed. The wet-muscle weights were recorded and normalized (mg/100 g body weight).

RESULTS

No significant differences in the mean muscle weights of either the soleus or plantaris were found among the groups. However, mean muscle weights of the gastrocnemius for the groups that exercised 2 sessions per week (551.93 mg/100g) or 5 sessions per week (548.91 mg/100g) were significantly greater than that of the sedentary controls (518.82 mg/100g)($p = 0.036$ and $p = 0.042$, respectively). Mean muscle weights of the exercised groups did not differ sinificantly.

CONCLUSION

Voluntary resistance exercise, using the present approach, resulted in an increase in gastrocnemius muscle weight of the rat in as little as eight weeks. No effect of duty cycle was found. Results suggest that the present approach is a viable model for studies of muscle hypertrophy and other physiological responses to long-term resistance exercise.