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Voluntary Resistance Exercise Training With Obese and Lean Zucker Rats: 976 *Board #198* 9:00 AM - 10:30 AM

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PURPOSE

Fatty Zucker rats have been used to examine the effects of obesity, and diabetes on the physiological mechanisms associated with exercise-induced musculosketetal adaptation. Because many volitional exercise models use operant conditioning techniques that rely on dietary restrictions to sufficiently motivate voluntary behavior, a study was conducted to determine if obese Zucker rats could be trained to perform a voluntary weight-lifting movement without altering their diet.

METHODS

Using a custom-designed hind limb loading apparatus, eight 6-weekold male genetically obese Zucker rats (fa/fa) and eight Zucker lean rats (+/fa) were trained with positive reinforcement to enter a vertical tube, insert their head into a neck ring, and repeatedly lift and lower their body weight in a movement that targeted the plantar flexor muscle group. Training sessions were conducted 5 days per week and each lasted until at least 50 lifting and lowering movements were performed or 1.5 hrs. One 45-mg sucrose pellet was given as a reinforcer, after every second lift. Food and water were available in the home cage at all times.

RESULTS

As expected, mean body weights increased rapidly in the obese rats from 201 g at 6 weeks old to 789 g at 23 weeks old. During the same period mean body weights of the Zucker leans increased from 183 g to 457 g. All rats successfully acquired the weight-lifting movement. However, of the obese Zucker rats only 2 were able to approach the goal of 50 lifts per session with a mean of 47 lifts per session. The mean lifts per session for the remaining 6 obese rats ranged from 5 to 25. 5 of 8 lean Zucker rats were able to approach the 50-lifts/session goal with a mean range of 47-51. The 3 other lean rats recorded means of 28, 30, 35, lifts per session, respectively.

CONCLUSIONS

Results demonstrate that genetically obese Zucker rats can be trained to perform a voluntary movement for reward. However, food reward was unable to continually motivate the Zucker obese rats towards a goal of 50-body weight lifts per day. Conversely, it was sufficient to elicit continual lifting of Zucker leans. In summary the procedures used in this study were not sufficient to maintain a consistent lifting pattern in obese Zucker rats.