Exertional rhabdomyolysis in a 21-year-old, healthy female after performing three sets of the biceps curl exercise to failure with 30% 1RM: A case report

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Exertional rhabdomyolysis: a 21-year-old, healthy female after performing three sets of the biceps curl exercise to failure with 30% 1RM: A case report.

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Abstract

Background: The optimal resistance training program to elicit muscle hypertrophy has been constantly debated and researched. Although 3 sets of 10 repetitions at 70% 1RM load (70% 1RM), high repetition [sets of 30-40 repetitions] resistance training can elicit similar muscle hypertrophy, there is not always a consensus on the optimal exercise that is most beneficial for a desired outcome, especially perhaps because less weight is lifted for a longer duration. In the process of testing this hypothesis in a research study in our laboratory, a subject was diagnosed with exertional rhabdomyolysis.

Methods: A 21-year-old Caucasian female volunteered to participate in a research study that aimed at comparing the acute effects of low-load (30% 1RM), high-repetition versus high-load (70% 1RM), low-repetition resistance exercise on muscle protein synthesis and muscle swelling measured by B-mode ultrasound imaging. All resistance exercise and testing in this study was performed in a university laboratory where the room temperature was controlled between 21 and 24 °C (70 and 75 °F).

Results: The subject was diagnosed with exertional rhabdomyolysis (ER). She was 5 foot 5 inch tall and her weight was 62 kg (137 lbs), which was used to calculate her BMI of 21.8 kg/m², which is classified as a “normal” according to the National Institutes of Health's BMI classifications [2]. The subject was then familiarized to the protocol by completing a standard trial and error trial to familiarize the subject with the movements and to ensure the subject was able to complete each repetition with a comfortable speed and in a symmetric fashion. She then filled out a health and exercise history questionnaire. Her training history included regular participation in an interval training program of running, walking, and/or using a lateral elliptical almost daily. She is a native of Nebraska and was diagnosed with exertional rhabdomyolysis as a result of participating in a resistance training study. The subject agreed to provide the details of her participation in a resistance training study. The subject agreed to provide the details of her participation in a resistance training study.

Discussion

The subject of this case study is a 21-year-old, healthy female. She was diagnosed with exertional rhabdomyolysis after completing 3 sets of low-load, high-repetition bilateral biceps curl exercises with 30% 1RM (4 kg) for 120 total repetitions as a noninvasive monitoring of the swelling prior to the onset of complaints.

Figure 2. Bar graphs of the echo intensity (A) and muscle thickness (B) measurements at various time points before and after the resistance training exercise.

Case Report

A 21-year-old Caucasian female volunteered to participate in a research study that aimed at comparing the acute effects of low-load (30% 1RM), high-repetition versus high-load (70% 1RM), low-repetition resistance exercise on muscle protein synthesis and muscle swelling measured by B-mode ultrasound imaging. All resistance exercise and testing in this study was performed in a university laboratory where the room temperature was controlled between 21 and 24 °C (70 and 75 °F). The subject was familiarized with the movements and to ensure the subject was able to complete each repetition with a comfortable speed and in a symmetric fashion. She then filled out a health and exercise history questionnaire. Her training history included regular participation in an interval training program of running, walking, and/or using a lateral elliptical almost daily. She is a native of Nebraska and was diagnosed with exertional rhabdomyolysis as a result of participating in a resistance training study. The subject agreed to provide the details of her participation in a resistance training study. The subject agreed to provide the details of her participation in a resistance training study.

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The subject of this case study is a 21-year-old, healthy female. She was diagnosed with exertional rhabdomyolysis after completing 3 sets of low-load, high-repetition bilateral biceps curl exercises with 30% 1RM (4 kg) for 120 total repetitions as a noninvasive monitoring of the swelling prior to the onset of complaints. This case study has indicated that acute swelling increased her muscle thickness to 2.285 cm (Figure 2b). The magnitude of increase was 0.342 cm (16.3%).

Several days after her second laboratory visit, the subject reported that she was unable to fully extend her forearms due to excessive swelling and at just proximal to both elbows, with the left elbow appearing more swollen than the right. She also reported exercise muscle cramping in both her arms that started 2 days after her laboratory visit and was persistent on the third day. After being informed of these signs and symptoms, the investigators encouraged the participant to visit the University Health Center for medical attention. Subsequently, approximately 27 hours post-exercise, the subject received medical attention, which included a physician consultation and a routine antecubital venipuncture blood draw. After receiving medical attention, she was sent home with instructions to take acetaminophen (rather than aspirin, ibuprofen, or naprosyn) and drink plenty of water and await her blood test results.

Several hours later, she was called and informed of the test results. Figure 3a and b show the echo intensity (EI) and muscle thickness measurements at 1, 3, and 4 days post-exercise. Our laboratory has published the results of three separate experiments in peer-reviewed, scientific journals on the comparison of load-low, high-repetition versus high-load, low-repetition resistance exercise in a research setting. These experiments involved participants in peer-reviewed, scientific journals on the comparison of load-low, high-repetition versus high-load, low-repetition resistance exercise in a research setting.

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Figure 4. Creatine kinase (CK) concentrations at various time points before and after the resistance training exercise.

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