BEST of the LITERATURE

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Muscle Healing Under High Pressure?


Hyperbaric oxygen (HBO) has a long history of use in medicine, but the few studies examining its effectiveness for soft-tissue sports injuries present conflicting views of its effectiveness. According to a recent randomized, controlled trial, however, HBO is not effective in treating exercise-induced muscle injury.

Study participants were 16 sedentary female university students (average age, 25 years). Participants were assigned to a control group or an experimental group and blinded to their group and treatment assignment. Measurements of strength, perceived muscle soreness, and quadriceps circumference were taken at baseline (day 1) and after each of the four treatment sessions (days 2 through 5). All participants did 30 sets of 10 repetitions per minute with their nondominant leg (110° to 35° of knee flexion) on a dynamometer to produce muscle damage and injury, and groups were treated in the postexercise period (days 2 through 5).

Experimental-group patients had HBO treatments for muscle soreness of 100% oxygen for 60 minutes at 2.0 atmospheres absolute. The control group received 21% oxygen for 60 minutes at 1.2 atmospheres absolute. Blood samples were taken for measuring muscle markers of damage, and magnetic resonance imaging of the quadriceps was done on day 1, day 3 (24 hours postexercise), and day 5 (72 hours postexercise).

Dependent variables (perceived muscle soreness, isokinetic strength, quadriceps circumference, and creatine kinase and malondialdehyde levels) were analyzed by repeated-measures analysis of variance to assess the difference between treatment and control groups. No significant differences occurred between the two groups for any dependent variable.

The authors note that different injuries may require different hyperbaric regimens and that additional research will be needed to tease out which regimen is beneficial for given injuries.

COMMENT

Despite lack of convincing scientific evidence, the use of HBO for treating soft-tissue injuries appears to be increasing, especially among professional athletes. This well-designed study confirms two previous studies that demonstrate HBO is not effective in reducing delayed-onset muscle soreness in individuals performing unaccustomed intense eccentric exercise. However, the ineffectiveness of HBO in preventing delayed-onset muscle soreness does not necessarily mean that the modality is not effective in the treatment of other soft-tissue injuries. The jury is still out on the effectiveness of HBO for injuries such as ligament sprains and muscle strains.

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Menstrual Cycles Do Not Affect Muscle Strength


Studies of female hormonal influence on muscle strength, muscle endurance, and performance have been contradictory, yet few studies have documented actual hormone levels during testing. No significant variation was noted in muscle strength and muscle endurance during menstrual cycles, according to a prospective study of moderately active university students.

Participants were 15 female volunteers who maintained moderate levels of physical activity. Study subjects (average age, 25.3 years) were in good health, did not smoke, and had regular menstrual cycles (mean interval, 28.2 days). Study subjects did not take oral contraceptives for at least 3 months before or during the study.

Participants were tested in two consecutive menstrual cycles, with three test sessions during each cycle (early follicular phase, ovulation phase, and midluteal phase). Cycle phases were confirmed by hormone level measurements from blood samples, and ovulation was detected by analysis of luteinizing hormone surge in the urine. Muscle testing consisted of handgrip strength in the dominant hand, one-hop leg test, and isokinetic muscle strength and endurance assessments (knee extension on a standard instrument). Ten participants completed the tests.

No significant variance in muscle strength and muscle endurance was observed during the menstrual cycle. Unlike other studies showing differences during the cycle, this study validated the hormonal status of the cycle phase and was performed twice in successive menstrual cycles.

Although these participants manifested no differences during their cycles, it is not known if these data would apply to highly trained female athletes.

COMMENT

This paper addresses an area of extreme interest, which, surprisingly—especially given the increase in competitive female athletes—has still not been well-researched. It eliminates many of the earlier methodologic problems by accurately documenting menstrual cycle phases, by using a variety of validated tests, and by retesting the same patients during two consecutive cycles. One other group has further employed electromyographic stimulation to ensure maximal neural activation and muscle contraction, and, likewise, they were not able to demonstrate any statistically significant strength differences in 19 women over three cycle phases. Nevertheless, the current study still represents only a small number of moderately trained women. Therefore, it is more difficult to make generalizations about such effects in elite athletes who frequently experience menstrual dysfunction such as oligomenorrhea or amenorrhea. Similarly, the potential impact of exogenous hormones, such as in oral contraceptives, is unknown.

REFERENCE