

The Effect of Different Strength Training Methods on Muscle Strength, Body Composition and Factors Affecting Endurance Performance

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Abstract : The main purpose of this study was to measure the effect of two different strength training methods on muscle strength, muscle mass, fat mass and endurance factors. Fourteen physical education students accepted to participate in this study. The participants were then randomly divided into three groups, traditional training group (TTG), cluster training group (CTG) and control group (CG). TTG consisted of 4 participants aged (\pm SD) (22.3 ± 1.5 years), body mass (79.2 ± 15.4 kg) and height (178.3 ± 11.9 cm). CTG consisted of 5 participants aged (22.2 ± 3.5 years), body mass (81.0 ± 24.0 kg) and height (180.2 ± 12.3 cm). CG consisted of 5 participants aged (22 ± 2.8 years), body mass (77 ± 19 kg) and height (174 ± 6.7 cm). The participants underwent a hypertrophy strength training program twice a week consisting of 4 sets of 10 reps at 70% of one-repetition maximum (1RM), using barbell squat and barbell bench press for 8 weeks. The CTG performed 2 x 5 reps using 10 s recovery in between repetitions and 50 s recovery between sets, while TTG performed 4 sets of 10 reps with 90 s recovery in between sets. Pre- and post-tests were administered to assess body composition (weight, muscle mass, and fat mass), 1RM (bench press and barbell squat) and a laboratory endurance test (Bruce Protocol). Instruments used to collect the data were Tanita BC-601 scale (Tanita, Illinois, USA), Woodway treadmill (Woodway, Wisconsin, USA) and Vyntus CPX breath-to-breath system (Jaeger, Hoechberg, Germany). Analysis was conducted at all measured variables including time to peak VO₂, peak VO₂, heart rate (HR) at peak VO₂, respiratory exchange ratio (RER) at peak VO₂, and number of breaths per minute. The results indicate an increase in 1RM performance after 8 weeks of training. The change in 1RM squat was for the TTG = 30 ± 3.8 kg, CTG = 28.6 ± 8.3 kg and CG = 10.3 ± 13.8 kg. Similarly, the change in 1RM bench press was for the TTG = 9.8 ± 2.8 kg, CTG = 7.4 ± 3.4 kg and CG = 4.4 ± 3.4 kg. The within-group analysis from the oxygen consumption measured during the incremental exercise indicated that the TTG had only a statistical significant increase in their RER from 1.16 ± 0.04 to 1.23 ± 0.05 ($P < 0.05$). The CTG had a statistical significant improvement in their HR at peak VO₂ from 186 ± 24 to 191 ± 12 Beats Per Minute ($P < 0.05$) and their RER at peak VO₂ from 1.11 ± 0.06 to 1.18 ± 0.05 ($P < 0.05$). Finally, the CG had only a statistical significant increase in their RER at peak VO₂ from 1.11 ± 0.07 to 1.21 ± 0.05 ($P < 0.05$). The between-group analysis showed no statistical differences between all groups in all the measured variables from the oxygen consumption test during the incremental exercise including changes in muscle mass, fat mass, and weight (kg). The results indicate a similar effect of hypertrophy strength training irrespective of the methods of the training used on untrained subjects. Because there were no notable changes in body-composition measures, the results suggest that the improvements in performance observed in all groups is most probably due to neuro-muscular adaptation to training.

Keywords : hypertrophy strength training, cluster set, Bruce protocol, peak VO₂

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