Differences in Assistance Exercise Volume-Load Prescription during Fatigue Induced Resistance Training

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Abstract

The common purpose of assistance lift application within resistance training is to prevent injury of sport-specific predisposed musculature by strengthening a specific muscle or muscle group. The integration of assistance exercises within standard resistance training is frequently observed, showcasing a high ecological validity of assistance exercises. However, specific prescription of assistance exercises has received little empirical examination. **PURPOSE:** Therefore, the purpose of the current investigation was to examine changes in assistance lift performance due to fatigue induced resistance training. **METHODS:** Fourteen resistance trained individuals (male = 7, female = 7, age = 20.93 ± 1.54, ht = 68.07 ± 4.16 cm, wt = 78.33 ± 12.86 kg) participated in 5 resistance training sessions. Session 1 consisted of anthropometric and skinfold testing, one repetition maximum (1RM) testing for barbell back squat (SQ) and barbell bench press (BP), and familiarization of assistance lifts. Session 2-5, involved a standardized dynamic warm up and a comprehensive resistance training session comprising 3 sets of 5 repetitions at 55%, 65%, and 75% 1RM, followed by 1 repetition maximum set at 85% 1RM for SQ and BP, ten minutes passive rest between exercises. Upon 5-minute rest, participants completed 4 sets of 2 repetitions-in-reserve for 3 assistance exercises (barbell reverse lunge [RL], barbell shoulder press [SP], and barbell bent-over row [BR]) in circuit format with 90s rest between circuits. Weight lifted and repetitions completed were recorded and combined as volume-load for each assistance lift. Total session volume-load was the sum of volume-load of all assistance exercises. In order, 72, 48, 24, and 6 h rest periods were assigned as between session recovery intentionally decreasing in time to elicit fatigue. A 3 (exercise) x 4 (session) mixed factorial ANOVA was used to determine difference in assistance lift volume-load. **RESULTS:** Due to the data violating assumptions of sphericity (p < .001) ANOVA test statistics are estimated using the Greenhouse-Geisser method. There is a significant main effect for assistance exercise volume-load (p < .001). There is no significant interaction between session volume-load (p = .846). Bonferroni post hoc expressed significant differences between all assist ance exercises within all sessions, except, RL and SPduring session 2 (p = .476) and RL and SP during session 4 (p = .130). **CONCLUSION:** These data suggest assistance exercises are inherently different and exercise specific prescriptions should be established for assistance lifts. While there was no significant interaction, Cohen's d analysis indicated a medium effect size between cumulative session volume-load of session 1 and session 3 (d = .28), as well as session 1 and session 4 (d = .29). These magnitudinal differences support assistance lift prescription modulation based on fatigue. Furthermore, research examining load, volume, and intensity prescriptions necessitates further investigation to ensure resistance training prescriptions adhere to the principle of specificity.

Introduction

The common purpose of assistance lift application within resistance training is to prevent injury of sport-specific predisposed musculature by strengthening a specific muscle or muscle group. The integration of assistance exercises within standard resistance training is frequently observed, showcasing a high ecological validity of assistance exercises. However, specific prescription of assistance exercises has received little empirical examination.

Purpose Statement

Therefore, the purpose of the current investigation was to examine changes in assistance lift performance due to fatigue induced resistance training.

Method

Participants:

- N = 14 (7 males, 7 females), all resistance trained

Procedures:

Forms/Approval

- IRB approval, Informed consent completed
- All participants were familiarized to procedures and equipment

Testing Sessions

- 5 resistance training sessions
- Session 1 – 1RM for squat and bench press using NSCA standardized procedures
- Session 2 through 5 (counterbalanced) following a comprehensive, fatiguing resistance training protocol
  - 3 sets of 55%, 65%, 75% 1RM, followed by 1 set AMRAP at 85% 1RM for SQ and BP
  - Upon completion of the 3 sets for both SQ and BP, participants completed 4 sets of 2 RIR circuit of RL, SP, BR

Measured Variables

- Volume-load prescription of assistance exercises

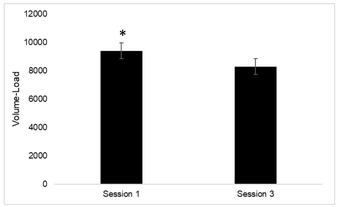
Statistical Analyses

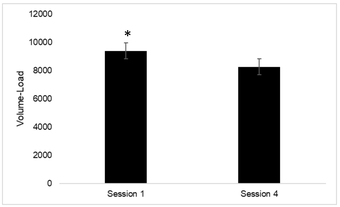
- 3 (exercise) x 4 (session) mixed factorial ANOVA
- Bonferroni post hoc analysis showed differences between all assistance exercises within all sessions except, RL and SP during session 2 (p = .476) as well as RL and SP during session 4 (p = .130)

Variable	Male (n = 7)	Female (n = 7)	Total Participants (n = 14)
Height (in)	70.8 ± 2.6	65.2 ± 3.5	68.0 ± 4.1
Weight (lbs)	189.8 ± 15.7	155.5 ± 28.4	172.7 ± 28.3
Age	21.7 ± 1.7	20.1 ± 0.8	20.9 ± 1.5
Body Fat (%)	12.9 ± 3.8	25.1 ± 5.0	19.0 ± 7.6
Max Squat (lbs)	350.7 ± 32.7	213.5 ± 43.2	282.1 ± 80.1
Max Bench Press (lbs)	267.8 ± 41.7	112.8 ± 18.2	190.3 ± 86.1

Results

Due to the data violating assumptions of sphericity (p < .001) ANOVA test statistics are estimated using the Greenhouse-Geisser method. There is a significant main effect for assistance exercise volume-load (p < .001). There is no significant interaction between session volume-load (p = .846).





Discussion

These data suggest assistance exercises are inherently different and exercise specific prescriptions should be established for assistance lifts. While there was no significant interaction, Cohen's d analysis indicated a medium effect size between cumulative session volume-load of session 1 and session 3 (d = .28), as well as session 1 and session 4 (d = .29). These magnitudinal differences support assistance lift prescription modulation based on fatigue. Furthermore, research examining load, volume, and intensity prescriptions necessitates further investigation to ensure resistance training prescriptions adhere to the principle of specificity.

References

Bompa, T.A. & Haff, G. G. (2009). *Periodization: Theory and Methodology of Training*. 5th ed. Champaign, IL: Human Kinetics, 31-122, 259-286.

Haff, G. G. & Triplett, N. T. (2015). *Essentials of Strength Training and Conditioning*. 4th ed. Champaign, IL: Human Kinetics, National Strength and Conditioning Association (NSCA), 444-445.

Kraemer, W. J., & Ratamess, N. A. (2004). Fundamentals of resistance training: progression and exercise prescription. *Medicine & science in sports & exercise*, 36(4), 674-688.

Pauletto, B. (1986). Choice and order of exercise. *NSCA J* 8(2): 71-73.