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Initial Resistance Training Status Influences Upper Body Strength and Power Development

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Abstract : Purpose: Maximal strength and maximal power are key athletic abilities in many sports disciplines. In recent years, velocity-based training (VBT) with a relatively high 75-85% 1RM resistance has been popularized in preparation for powerlifting and various other sports. The purpose of this study was to discover differences between beginner/intermediate and advanced lifters' push/press performances after a heavy resistance-based BP training program. Methods: A six-week, three-workouts per week program was administered to 52 young, physically active adults (age: 22.4±5.1; 12 female). The majority of the participants (84.6%) had prior experience in bench pressing. Typical workouts began with BP using 75-95% 1RM in the 1-5 repetition range. The sets in the lower part of the range (75-80% 1RM) were performed with velocity-focus as well. The BP sets were followed by seated dumbbell presses and six additional upper-body assistance exercises. Pre- and post-tests were conducted on five test exercises: one-repetition maximum BP (1RM), calculated relative strength index: BP/BW (RSI), four-repetition maximal-effort dynamic BP for peak concentric velocity with 80% 1RM (4RV), 4-repetition ballistic pushups (BPU) for height (4PU), and seated medicine ball toss for distance (MBT). For analytic purposes, the participant group was divided into two subgroups: self-indicated beginner or intermediate initial resistance training status (BITS) [n=21, age: 21.9±3.6; 10 female] and advanced initial resistance training status (ATS) [n=31, age: 22.7±5.9; 2 female]. Pre- and post-test results were compared within subgroups. Results: Paired-sample t-tests indicated significant within-group improvements in all five test exercises in both groups ($p < 0.05$). BITS improved 18.1 lbs. (13.0%) in 1RM, 0.099 (12.8%) in RSI, 0.133 m/s (23.3%) in 4RV, 1.55 in. (27.1%) in BPU, and 1.00 ft. (5.8%) in MBT, while the ATS group improved 13.2 lbs. (5.7%) in 1RM, 0.071 (5.8%) in RSI, 0.051 m/s (9.1%) in 4RV, 1.20 in. (13.7%) in BPU, and 1.15 ft. (5.5%) in MBT. Conclusion: While the two training groups had different initial resistance training backgrounds, both showed significant improvements in all test exercises. As expected, the beginner/intermediate group displayed better relative improvements in four of the five test exercises. However, the medicine ball toss, which had the lightest resistance among the tests, showed similar relative improvements between the two groups. These findings relate to two important training principles: specificity and transfer. The ATS group had more specific experiences with heavy-resistance BP. Therefore, fewer improvements were detected in their test performances with heavy resistances. On the other hand, while the heavy resistance-based training transferred to increased power outcomes in light-resistance power exercises, the difference in the rate of improvement between the two groups disappeared. Practical applications: Based on initial training status, S&C coaches should expect different performance gains in maximal strength training-specific test exercises. However, the transfer from maximal strength to a non-training-specific performance category along the F-v curve continuum (i.e., light resistance and high velocity) might not depend on initial training status.

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