Influence of Power and Strength-Power Training on Load-Velocity Performance
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Introduction

The purpose of this study was to compare the impact of power and strength-power training on the load-velocity, load-force, load-power, and load-jump height relationships in the jump squat.

Power training with loads equal to body mass has been shown to improve measures of athletic performance (Wilson 1993). Combined strength-power training programs have also been shown effective in improving tests of athletic performance (Harris et al., 2000) and the force-velocity relationship (Toji et al., 1997).

A limited number of investigations have compared power and strength-power training programs. Toji et al. (1997) demonstrated that strength-power training of the upper body improved both maximal velocity and force production during elbow flexion-extension power training only improved maximal velocity. Harris et al. (2000) demonstrated that both power and strength-power groups increased vertical jump peak power and jump height; however, the strength-power group also improved 10 and 30-yard sprint times and squats one-repetition maximum (1RM). Thus, the results of these studies indicate that strength-power training may be more effective than power training for improving measures of athletic performance. However, the amount of work completed by the training groups in these studies may not have been equivalent; subsequently, the changes in athletic performance may have been the result of the amount of work completed and not the method of training.

No previous study has attempted to equate work while measuring the impact of power and strength-power training on jump squat performance.

Methods

Subjects:
- Recreationally trained males (n=26)
  - 3 groups: power training (n=10), strength-power training (n=8), control (n=8)
- Training Program: 12-weeks with equal work (Table 1)
- Power training group (7 sets of 6 jump squats at body mass)
- Strength-power training group (3 sets of 6 jump squats at body mass + 3 sets of 3 squats at 90% of 1RM)
- Control group (no training)

Outcome Measures:
- Anthropometric and Strength Assessments (Table 2)
  - Body Mass and Body Fat (%)
  - Squat 1RM, Squat 1RM/Body Mass Ratio, and Isometric Squat Peak Force
- Measurements (mid, wk-6), and post-testing (wk-12)
  - Jump Squat: Peak Power (PP), Peak Force (PF), Jump Height (JH), Peak Velocity (PV)
  - Squat: 1RM, 1RM/Body Mass, and Isometric Squat Peak Force

Results

Table 2. Anthropometric and Strength Variables

<table>
<thead>
<tr>
<th>Measure</th>
<th>Baseline (wk 0)</th>
<th>Mid-Test (wk 6)</th>
<th>Post-Test (wk 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (kg)</td>
<td>Power Group</td>
<td>Control Group</td>
<td>Power Group</td>
</tr>
<tr>
<td></td>
<td>1.4±0.3</td>
<td>1.6±0.3</td>
<td>1.6±0.3</td>
</tr>
<tr>
<td>Body Composition (% Fat)</td>
<td>Power Group</td>
<td>Control Group</td>
<td>Power Group</td>
</tr>
<tr>
<td></td>
<td>15.7±3.5</td>
<td>16.7±4.4</td>
<td>15.6±3.4</td>
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<tr>
<td>1RM (kg)</td>
<td>Power Group</td>
<td>Control Group</td>
<td>Power Group</td>
</tr>
<tr>
<td></td>
<td>107.5±21.8</td>
<td>116.3±28.7</td>
<td>118.5±26.1</td>
</tr>
</tbody>
</table>

Conclusion

Combined strength and power training resulted in increased power output over a greater portion of the load-power relationship than power training alone. While both types of training allowed for marked improvements in maximal jump height and maximal power output in the jump squat, the overall impact of strength-power training on the load-velocity, load-force, load-power, and load-jump height relationships indicate its superior transference to a wide variety of on-field demands associated with strength-power sports.

Strength and conditioning coaches should implement both strength and power exercises in training programs designed to improve both maximal strength and peak power.