Effects of Whey Protein and Resistance Exercise on Body Composition and Muscle Strength in Women with HIV Infection

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INTRODUCTION

Wasting syndrome in HIV infection describes the unintentional loss of body weight, generally accompanied by significant loss of life-supporting body cell mass (BCM). Recurrent cycles of wasting are common in HIV disease, with body weight being primarily regained as fat. The disproportionate loss of body protein with each weight-loss episode can lead to critical loss of BCM, which is directly related to decreased physical function and strongly associated with time of death. Strategies directed at reversing wasting, that is, administration of growth hormone or anabolic steroids, may accrue lean body mass but often fall short of improving physical performance or the quality of life. These drug therapies can be associated with unpleasant side effects or toxicity, and few studies have included HIV-seropositive women, who represent a growing proportion of patients. We prospectively studied the separate and combined effects of whey protein (PRO) and progressive resistance exercise (PRE) upon body composition and physical function in 30 malnourished HIV-infected women (BCM/height ≤ 90% of race/sex normal values). The women were studied for a six-week control period and then randomized to PRO, PRE, or combined PRO-PRE groups for 14 weeks.

MEASUREMENTS

We assessed body weight (BW), BCM by \(^{40}\)K counting, fat-free mass (FFM) and fat mass (FM) by dual-energy X-ray absorptiometry, total body and extracellular water by probe dilution, maximal strength of selected muscle groups (1-RM), and quality of life (QOL).

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RESULTS

There were no changes in BW, BCM, 1-RM, or QOL during the control period. Significant increases in 1-RM were noted in both exercise groups (PRE, PRO-PRE) \((p < 0.001)\), with lesser increases for PRO (Fig. 1). QOL improved in both exercise groups, with a significant increase in physical activity for the PRE group. Table 1 shows the pre- to posttreatment changes in body composition. PRO led to the greatest weight gain, which was primarily fat. By contrast, PRE led to similar gains in BCM and FFM, but much greater increases in muscle strength. The combination group (PRO-PRE) gained less weight than PRO but had similar increases in strength as the PRE group.

CONCLUSION

Protein supplementation and resistance exercise had different effects on body composition and muscle function in HIV-positive women. Although both therapies increased BCM, PRO promoted weight gain, whereas PRE promoted muscle function. Treatment with PRO and PRE provided a patient-directed, nonpharmaceutical, low-cost approach to augment BCM in catabolic HIV-infected patients.

<table>
<thead>
<tr>
<th>Group</th>
<th>BW (kg)</th>
<th>p</th>
<th>BCM (kg)</th>
<th>p</th>
<th>FFM (kg)</th>
<th>p</th>
<th>FM (kg)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRO</td>
<td>+3.6 ± 2.3</td>
<td>0.001</td>
<td>+0.5 ± 0.8</td>
<td>0.085</td>
<td>+1.5 ± 1.9</td>
<td>0.010</td>
<td>+2.1 ± 1.4</td>
<td>0.002</td>
</tr>
<tr>
<td>PRE</td>
<td>−0.1 ± 2.0</td>
<td>0.891</td>
<td>+0.7 ± 0.9</td>
<td>0.028</td>
<td>+1.6 ± 2.4</td>
<td>0.057</td>
<td>−1.8 ± 2.4</td>
<td>0.049</td>
</tr>
<tr>
<td>PRO-PRE</td>
<td>+1.3 ± 3.8</td>
<td>0.264</td>
<td>+0.6 ± 0.6</td>
<td>0.010</td>
<td>+1.4 ± 2.0</td>
<td>0.038</td>
<td>−0.09 ± 3.7</td>
<td>0.814</td>
</tr>
</tbody>
</table>

Abbreviations: BW, body weight; BCM, body cell mass; FFM, fat-free mass; FM, fat mass. Note: Values are mean ± SD, \(p < 0.05\).

**FIGURE 1.** Change in summed muscle strength, \(^*p < 0.001\).
REFERENCES