

Dialysis Rehabilitation and Muscle Hypertrophy

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Abstract : Introduction: It has been known that chronic kidney disease (CKD) patients can benefit from physical exercise during dialysis therapy improving aerobic capacity, muscle function, cardiovascular function, and overall health-related quality of life. This study aimed to evaluate the effectiveness of dialysis rehabilitation. Materials and Methods: A total of 55 patients underwent two-hour resistance exercise training during each hemodialysis session for three consecutive months. Various routine clinical data were collected, including the calculation of the planar dimension of the muscle area in both upper legs at the level of the ischial bone. This area calculation was possible in 26 patients who had yearly plain abdominal computed tomography (CT) scans. DICOM files from the CT scans were used with 3D Slicer software for area calculation. An age and sex-matched group of 26 patients without dialysis rehabilitation also had yearly CT scans during the study period for comparison. Clinical data were compared between the two groups: Group A (rehabilitation) and Group B (non-rehabilitation). Results: There were no differences in basic laboratory data between the two groups. The average muscle area before and after rehabilitation in Group A was 212 cm² and 216 cm², respectively. In Group B, the average areas were 230.0 cm² and 225.8 cm². While there was no significant difference in absolute values, the average percentage increase in muscle area was +1.2% (ranging from -7.6% to 6.54%) for Group A and -2.0% (ranging from -12.1% to 4.9%) for Group B, which was statistically significant. In Group A, 9 of 26 were diabetic (DM), and 13 of 26 in Group B were non-DM. The increase in muscle area for DM patients was 4.9% compared to -0.7% for non-DM patients, which was significantly different. There were no significant differences between the two groups in terms of nutritional assessment, Kt/V, or incidence of clinical complications such as cardiovascular events. Considerations: Dialysis rehabilitation has been reported to prevent muscle atrophy by increasing muscle fibers and capillaries. This study demonstrated that muscle volume increased after dialysis exercise, as evidenced by the increased muscle area in the thighs. Notably, diabetic patients seemed to benefit more from dialysis exercise than non-diabetics. Although this study is preliminary due to its relatively small sample size, it suggests that intradialytic physical training may improve insulin utilization in muscle fiber cells, particularly in type II diabetic patients where insulin receptor function and signaling are altered. Further studies are needed to investigate the detailed mechanisms underlying the muscle hypertrophic effects of dialysis exercise.

Keywords : dialysis, exercise, muscle, hypertrophy, diabetes, insulin

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