

Intradialytic neuromuscular electrical stimulation and oral nutritional supplements in HD patients

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Background/Aims: Exercise and nutritional support are established interventions for sarcopenia. Intradialytic neuromuscular electrical stimulation (NMES) showed improvement of muscle health and quality of life (QoL). We aimed to evaluate the effect of simultaneous nutritional support and NMES in hemodialysis (HD) patients.

Methods: We performed a 12-week, randomized controlled, parallel group, multicenter trial (n=72). The participants were randomly assigned in a 1:1:1:1 ratio to control (C), intradialytic NMES (NMES), protein supplementation (P), and intradialytic NMES combined with protein supplementation (NMES+P) groups. NMES was delivered to a total of four areas of the bilateral vastus medialis and vastus lateralis. A total of 25 grams of protein supplements was provided at every dialysis session. The primary outcome was the difference of hand grip (HGS) and leg muscle strength (LMS) at 12-weeks. Secondary outcomes included gait speed (GS), timed up and go (TUG)), and questionnaires.

Results: There was no difference in HGS, LMS, and muscle mass among 4 treatment groups. Faster and mean GS improved in both NMES (1.16 to 1.33 and 1.12 to 1.26 m/s, $p = 0.003$ and 0.01) and NMES+P groups (1.27 to 1.37 and 1.29 to 1.31 m/s, $p = 0.021$ and 0.038). Kidney disease effect, role limitations due to physical or emotional problems, and overall health ratings improved in the NMES+P group. Physical function aggravated in the C group. When we divided NMES and NMES+P groups into high and low NMES intensity groups, LMS was improved in the high intensity group (37.84 to 41.84 kg, $p = 0.026$). High NMES intensity group showed the improvement in both faster and mean GS ($p = 0.001$ and 0.006). Faster and mean TUG were shortened in high NMES intensity group (7.63 to 7.08 and 7.73 to 7.15 seconds, $p = 0.048$ and 0.036). Overall health ratings, physical function, and general health improved in the high NMES intensity group.

Conclusions: In this study, NMES and/or- protein supplementation did not make a significant difference in HGS and LMS. However, NMES or NMES+P improved functional capacity and QoL. More NMES was superior in muscle health and QoL. NMES can be a good option for HD patients who are unable or hesitant to exercise.