

# Strengthening exercises combined with protein supplement for patients with Huntington's disease: a pilot study

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## Background

Patients with Huntington's disease (HD) have reduced muscle strength, particularly in the lower extremities. It is unknown whether this is a primary or a secondary symptom of HD, however, it is clear that this reduction has a major impact on daily functioning. Although the physiotherapy clinical guidelines recommend strengthening exercise programs for HD patients, this recommendation needs more evidence for the early and middle stage of the disease. In addition to this, strengthening exercises combined with proteins show a significant improvement of muscle strength in healthy people. In HD patients, however, it is unknown which effect this combination has on muscle strength.

## Aims

To explore the effect of strengthening exercises combined with nutritional advice and protein supplements on lower limb muscle strength in HD patients.

## Methods

In this pilot, we invited HD patients to follow an 8 week training program followed by an 8 week training program combined with protein and nutritional advice provided by a dietician. The program consisted of muscle strength exercises. Data were collected at baseline, after 8 and 16 weeks. We measured One Repetition Maximum (1RM), Berg Balance Scale, 5 times sit-to-stand, Bio Impedance, 6-minutes walking distance and body weight.

## Results

Seven HD patients (♀=6 / ♂=1; age 33-75 years) completed the 16 week training program (Figure 1). The Total Functional Capacity ranged from 2 to 10. Overall, the muscle strength increased (Table 1). Between T0-T1, there was a significant difference in muscle strength on the Leg Extension for the left leg (median 30 vs. 36;  $p=0.034$ ) and for the Leg Curl for both legs (median right leg 34 vs. 39,  $p=0.038$ ; median left leg 21 vs. 39,  $p=0.042$ ). Group trend analysis showed a slight decline of body weight between T0-T1 (median 76 vs. 75 kg, NS); at T2 body weight was increased again to baseline level.

Table 1. Results of 7 HD patients on the 1RM and Berg Balance Scale

|                                 | Baseline<br>Median<br>(min-max) | T1<br>Median<br>(min-max) | T2<br>Median<br>(min-max) | <i>p</i> -value<br>T0-T2 | <i>p</i> -value<br>T0-T1 | <i>p</i> -value<br>T1-T2 |
|---------------------------------|---------------------------------|---------------------------|---------------------------|--------------------------|--------------------------|--------------------------|
| 1 RM<br>Leg extension right leg | 27 (12-55)                      | 33 (12-57)                | 37 (16-77)                | $p=0,007^*$              | $p=0,075$                | $p=0,127$                |
| 1 RM<br>Leg extension left leg  | 30 (12-36)                      | 36 (13-49)                | 39 (17-74)                | $p=0,034^*$              | $p=0,034^*$              | $p=0,140$                |
| 1 RM<br>Leg curl right leg      | 34 (12-72)                      | 39 (15-90)                | 43 (21-124)               | $p=0,006^*$              | $p=0,028^*$              | $p=0,309$                |
| 1 RM<br>Leg curl left leg       | 21 (12-75)                      | 39 (16-83)                | 44 (22-117)               | $p=0,012^*$              | $p=0,042^*$              | $p=0,061$                |
| Berg Balance Scale              | 49 (43-52)                      | 51 (43-54)                | 50 (35-53)                | $p=0,030^*$              | $p=0,038^*$              | $p=0,042^*$              |



Figure 1. Patient exercising

## Conclusions

All participating patients were able to perform the training program without limitations. Despite the small sample size, muscle strength improved significantly. In addition, patients showed signs of improvement of bodyweight in the period in which exercises were combined with protein supplements and additional nutritional advice. Some of the patients indicated that they benefit from the program on walking and muscle strength in daily life.

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