Grip Strength is More Than a Number: The Relationship Between Grip Strength and Fine Motor and Arm Function in FORTITUDE-ALS

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BACKGROUND

Grip Strength and Other Measures of ALS Disease Progression

• Grip strength is frequently performed as an outcome measure in amyotrophic lateral sclerosis (ALS) clinical trials, and may also be assessed as part of routine ALS care.

• The relationships of declining grip strength with fine motor function, as measured by the ALSFRS-R fine motor domain, have been studied, but not all studies have included men.

• Fine motor domain sub-scores are included in the ALSFRS-R to assess the patient's perception of difficulty using their arms and hands.

• ALSAQ-5 Question 2 assesses the participants' perception of difficulty using their arms and hands.

• ALSFRS-R fine motor domain sub-score.

• Grip strength

METHODS

• In FORTITUDE-ALS (NCT03169893), ALSFRS-R, bilateral grip strength, and the ALSAQ-5 were collected at Screening, Day 1, Weeks 2, 4, 8, 12, and follow-up.

• The average grip strength combined for both hands was summarized for men, and the relationships of declining grip strength with fine motor function, as measured by the ALSFKS-R fine motor domain sub-score, were investigated.

OBJECTIVES

• To investigate the relationship between grip strength and fine motor function as measured by the ALSFRS-R fine motor domain sub-score.

• To determine the correlation between ALSFRS-R fine motor domain sub-scores and ALSAQ-5 Question 2 scores for men and women.

RESULTS

Table 1. Average grip strength by ranges of ALSFRS-R fine motor domain sub-score

<table>
<thead>
<tr>
<th>Sub-score range</th>
<th>Sub-score change</th>
<th>Men (n = 150)</th>
<th>Women (n = 518)</th>
<th>Mean ± SD</th>
<th>Men (n = 150)</th>
<th>Women (n = 518)</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>3–4</td>
<td>1 point decrease</td>
<td>24.59 ± 18.09</td>
<td>25.36 ± 18.33</td>
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<td>24.59 ± 18.09</td>
<td>25.36 ± 18.33</td>
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<tr>
<td>7–9</td>
<td>3 point decrease</td>
<td>39.15 ± 24.13</td>
<td>38.23 ± 19.76</td>
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<td>39.15 ± 24.13</td>
<td>38.23 ± 19.76</td>
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<tr>
<td>10–12</td>
<td>4 point increase</td>
<td>47.38 ± 30.56</td>
<td>47.80 ± 26.98</td>
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<td>47.38 ± 30.56</td>
<td>47.80 ± 26.98</td>
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</tr>
</tbody>
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Figure 1. Average grip strength by change in ALSFRS-R fine motor domain sub-score

Figure 2. Average grip strength by change in ALSFRS-R fine motor domain sub-score

Handwriting

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<th>Sub-score change</th>
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<tr>
<td>≤ 2 point decrease</td>
<td>27.45 ± 21.66</td>
<td>26.49 ± 18.85</td>
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<td>26.49 ± 18.85</td>
<td></td>
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<tr>
<td>≥ 1 point increase</td>
<td>29.78 ± 19.64</td>
<td>28.68 ± 16.55</td>
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Figure 3. Scatter plots between average grip strength and ALSFRS-R fine motor domain sub-score

CONCLUSIONS

• In this analysis of FORTITUDE-ALS, mean grip strength in both hands combined:

  – Was strongly correlated with the fine motor domain sub-score of the ALSFRS-R.
  – Was moderately correlated with ALSAQ-5 Question 2 (perceived difficulty using arms).

• Our results suggest that grip strength has clinical and patient relevance as an outcome measure in ALS clinical trials.

REFERENCES


ACKNOWLEDGMENTS

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Figure 1. Average grip strength by change in ALSFRS-R fine motor domain sub-score

Figure 2. Average grip strength by change in ALSFRS-R fine motor domain sub-score

Figure 3. Scatter plots between average grip strength and ALSFRS-R fine motor domain sub-score

Figure 4. Distribution of grip strength

Table 2. Average grip strength by change in ALSFRS-R fine motor domain sub-score

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