

Strength and Functional Outcomes in LGMD2a

Lindsay Alfano, PT, DPT, PCS; Linda Lowes, PT, PhD; Xiomara Q Rosales, MD; Jerry R Mendell, MD.

Introduction: Limb Girdle Muscular Dystrophy type 2a (LGMD2a), caused by mutation of the CAPN3 gene leading to calpain-3 protein deficiency in affected individuals, is characterized by progressive weakness beginning in the proximal limb musculature.¹

Methods: 18 subjects with LGMD2a (11 ambulatory, 7 non-ambulatory) underwent strength and functional testing during one study visit. Maximal voluntary isometric contraction muscle strength of shoulder abductors, shoulder flexors and extensors, elbow flexors and extensors, hand grip, hip flexors and extensors, and knee flexors and extensors were measured. Ambulatory subjects also completed timed walking tests, stair climbing, and the modified timed up and go. Non-ambulatory subjects completed the Jebsen-Taylor Hand Function Test.

Results: Elbow and knee flexors were the weakest muscles tested in this group (elbow flexors mean: 16% predicted², range: 2-54%; knee flexors mean: 12.37% predicted, range: 1-40%). In ambulatory subjects, lower extremity muscle strength was highly correlated with distance walked in 1 through 6 minutes ($r=0.897-0.903$, $p=0.002-0.003$) and the 10 meter walk test ($r=-0.788$, $p=0.02$). Hip flexor strength was most highly predictive of distance walked ($r^2=0.784$, $p<0.001$). In non-ambulatory subjects, upper extremity strength was correlated to performance on 3 Jebsen items with the non-dominant hand (writing $r=0.829$, $p=0.042$; lifting light objects $r=0.939$, $p=0.006$; lifting heavy objects $r=0.819$, $p=0.046$).

Conclusions: In ambulatory subjects, timed walking tests were most highly correlated with strength. The distance walked in 1 through 6 minutes were highly correlated, indicating the 1 minute walk test may be sufficient for testing function in this disease. Only 3 Jebsen items were correlated with upper extremity strength in non-ambulatory subjects. This is most likely due to the proximal weakness pattern in LGMD2a with the Jebsen testing mostly distal hand function. This assessment may be useful in tracking disease progression in the weakest LGMD2a population. Further research is needed to validate these initial results.

References:

1. Wicklund MP, Mendell JR. The limb girdle muscular dystrophies our ever-expanding knowledge. *J Clin Neuromuscul Dis.* 2003;5(1):12-28.
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