Force, falls and fear of falls in myotonic dystrophy type 1

Cross-sectional and longitudinal studies

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I. Hammarén E, Ohlsson JA, Lindberg C, Kjellby-Wendt G. Reliability of static and dynamic balance tests in subjects with myotonic dystrophy type 1. Adv Physiother 2012; 14: 48–54. With Appendix.

II. Hammarén E, Kjellby-Wendt G, Kowalski J, Lindberg C. Factors of importance for dynamic balance impairment and frequency of falls in individuals with myotonic dystrophy type 1 – A cross-sectional study – Including reference values of Timed Up & Go, 10 m walk and step test. Neuromuscul Disord 2014;24(3)207-15.

III. Hammarén E, Kjellby-Wendt G, Lindberg C. Muscle force, balance and falls in muscular impaired individuals with myotonic dystrophy type 1 - A five-year prospective cohort study.
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ABSTRACT

Background: Myotonic dystrophy type 1 (DM1) is a neuromuscular multi-systemic disorder with slowly progressive muscle weakness. The overall purpose of this thesis was, in adult patients with DM1, to investigate factors of importance for functional balance skills and falls, and to investigate the natural course of muscle force and functional balance impairments, with reliable measurement methods.

Methods: In the first study we evaluated test-retest reliability in static and dynamic balance tests and gait, with three assessment occasions spaced one-week apart, in ten patients with DM1. In the second study, which is a cross-sectional study, 51 patients were assessed for muscle strength, gait and functional balance together with self-reported balance confidence, walking ability and falls. A multivariate analysis of factors of importance for functional balance impairment was performed. Of these 51 patients, 43 were further analysed in a third five-year prospective study for changes in muscle force, gait and functional balance together with self-reported balance confidence, walking ability and falls.

Results: The test-retest reliability analysis results advocate dynamic balance tests and timed gait before the static tests. The cross-sectional study shows that falls are common in the weaker, but still ambulant, patients. A combination of weak ankle muscles and a physical capability to accelerate to fast walking increased the risk of falling. Over five years the distal muscles of the leg have a more steep force decrease than the proximal muscles. There was a tendency towards a greater worsening in males, and we found a statistically significant difference between genders in the knee extensor and flexor force change. All men had fallen within the previous year at the five-year assessment. Injuries of the face and head were more frequent at five years.

Conclusions: Test-retest reliable dynamic balance tests and isometric muscle force measures showed that there is a statistically significant decrease in functional balance skill and in leg muscle force after five years in patients with DM1. The number of patients who had fallen had increased and the fall injuries were worse. It is of great importance to prevent falls especially in those who are at most risk for falls, by which we mean those who have a more steep muscle force reduction. Regular assessments of gait, functional balance and leg muscle force could be a way to determine who is at most risk for falls. This would give the opportunity to intervene with rehabilitation therapy and assistive devices as possible means for fall prevention in patients with DM1.

Keywords*:* myotonic dystrophy, physiotherapy, muscle force, postural balance, gait, reliability, cross-sectional, prospective

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