Steroid myopathy

Steroid myopathy is usually an insidious disease process that causes weakness mainly to the proximal muscles of the upper and lower limbs and to the neck flexors. Cushing originally described it in 1932, and Muller and Kugelberg first studied it systemically in 1959.

High-dose dexamethasone or long-term use can result in muscle myopathy in 10%-60% of glioblastoma patients, significantly reducing functional fitness and glioblastoma quality of life (QOL). There is a wealth of evidence to support the use of exercise as an adjuvant therapy to improve functional ability as well as help manage treatment-related symptoms. Specifically, resistance training has been shown to increase muscle mass, strength, and functional fitness in aging adults and several cancer populations. Although studies are limited, research has shown that exercise is safe and feasible in glioblastoma populations. However, it is not clear whether resistance training can be successfully used in glioblastoma to prevent or mitigate steroid-induced muscle myopathy and associated loss of function.

The primary purpose of this study is to establish whether an individualized circuit-based program will reduce steroid-induced muscle myopathy, as indicated by maintained or improved functional fitness for patients on active treatment and receiving steroids.

This is a 2-armed, randomized controlled trial with repeated measures. We will recruit 38 adult (≥18 years) patients diagnosed with either primary or secondary glioblastoma who are scheduled to receive standard radiation and concurrent and adjuvant temozolomide chemotherapy postsurgical debulking and received any dose of DEX through the neurooncology clinic and the Nova Scotia Health Cancer Center. Patients will be randomly allocated to a standard of care waitlist control group or standard of care + circuit-based resistance training exercise group. The exercise group will receive a 12-week individualized, group and home-based exercise program. The control group will be advised to maintain an active lifestyle. The primary outcome, muscle myopathy (functional fitness), will be assessed using the Short Physical Performance Battery and hand grip strength. Secondary outcome measures will include body composition, cardiorespiratory fitness, physical activity, QOL, fatigue, and cognitive function. All measures will be assessed pre- and postintervention. Participant accrual, exercise adherence, and safety will be assessed throughout the study.

Results: This study has been funded by the Canadian Cancer Society Atlantic Cancer Research Grant and the J.D. Irving Limited-Excellence in Cancer Research Fund (grant number 707182). The protocol was approved by the Nova Scotia Health and Acadia University's Research Ethics Boards. Enrollment is anticipated to begin in March 2022.

Conclusions: This study will inform how individualized circuit-based resistance training may improve functional independence and overall QOL of glioblastoma patients.

Trial registration: ClinicalTrails.gov NCT05116137; https://www.clinicaltrials.gov/ct2/show/NCT05116137.

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