Evaluation of muscle fatigue resistance in the elderly

Mets Tony (PhD, MD) 1,2 and Bautmans Ivan (PhD, MSc MT, PT) 1

1 Gerontology, Vrije Universiteit Brussel (VUB), Laarbeeklaan 103 B-1090 Brussels, Belgium
2 Geriatrics, Academic Hospital of the Vrije Universiteit Brussel (AZ-VUB), Laarbeeklaan 101 B-1090 Brussels, Belgium

Introduction

Although a wide variety of protocols are available for the evaluation of skeletal muscle fatigue resistance (FR), these methods often necessitate important technological resources or are too complicated for elderly subjects. Here we present a new test, designed for elderly persons, based upon maintaining as long as possible the maximal voluntary grip strength (GS). The aim of the study was to determine the reliability of this test procedure in hospitalized geriatric patients and in young healthy persons.

Methods

For the assessment of the fatigue resistance, the subject was asked to squeeze the rubber bulb of the Martin Vigorimeter (Elmed, Addison, USA) as hard as possible and instructed to maintain this pressure as long as possible (figure 1). The observer verified that the starting strength corresponded with the maximal GS tested before and, if too low, encouraged the participant to squeeze as hard as possible. The time (in seconds) until the pressure diminished to half of the maximal GS was recorded for each hand as a measure for FR. Twenty geriatric, hospitalized patients (age 83 ± 6 yrs) and thirty-nine young, healthy persons (age 23 ± 4 yrs) were evaluated for FR by two different observers. Height, weight and body mass index were determined for each participant and in the young subjects current amount of sports activity was registered

Results

All participants were able to perform the test. Inter-and intra-rater reliability in both subgroups was good to excellent with ICC(3,1) values ranging from 0.77 to 0.94 (see figure 1). No significant differences in inter- and intra-rater measurements were found, except for inter-rater evaluations of the dominant hand in hospitalized geriatric patients. No significant relationships were found between fatigue resistance and maximal grip strength, anthropometrics or gender

Conclusion

The proposed fatigue resistance test is a reliable tool to evaluate geriatric hospitalized patients as well as young, active and healthy persons. Fatigue resistance scores are not related to gender, maximal strength or anthropometrics within the observed subgroups.

References

Bautmans I and Mets T; Aging Clinical and Experimental Research; In Press