P 2-101

Reliability and validity of the portable dynamometer for knee extensor in a supine position

Min Yong Lee[1*], You Gyoung Yi[1], Kwan Sik Sung[1], In Pyo Jeon[1], Hyung Ik Shin[1†]

Seoul National University Hospital, Department of Rehabilitation Medicine[1]

Introduction

Intensive Care Unit Acquired Weakness (ICUAW) not only increases the length of stay in the Intensive Care Unit (ICU), but also gait disturbance after discharge. Although manual muscle testing is used to assess muscle strength subjectively and hand held dynamometer (HHD) is used to measure muscle strength objectively, it is not applicable on supine position for ICU patients., Therefore, in this study, we aimed to develop a portable instrument to measure knee extension strength in a supine position and to establish a reliability and validity of a portable dynamometer for knee extensor in normal population prior to applying with ICU patients.

Methods

A portable dynamometer for knee extensor was used to measure knee extension strength in a supine position (Fig. 1). The strength of the knee extension (Unit : N) of the dominant leg and lever arm length (Unit : m) from knee joint to HHD were evaluated by two different testers. The assessment consists of a total of three sessions and is evaluated three times per session (Fig.2). The first and second sessions were evaluated by one tester and the third was evaluated by another tester. Afterward, we evaluated the knee extensor strength using Biodex in sitting position for a validity assessment. We analyzed intra-rater reliability, inter-rater reliability and validity of the instrument from these strength measurement values.

Results

Fifteen subjects (Men : 8, Women : 7) were initially enrolled and 14 completed the test. One participant was excluded after the first session because of knee pain. Mean age of enrolled subjects is 28.64 ± 4.81 (Mean ± Standard deviation) years. The Intraclass Correlation Coefficient (ICC) values of intra-rater and inter-rater reliability are 0.989 and 0.985, respectively. The Pearson correlation coefficient between the torque obtained by multiplying the strength (N) by the lever arm length (m) and the Biodex value (N·m) was 0.935.

Conclusions

Inter-rater and intra-rater reliability for knee extensor strength using a portable dynamometer for knee extensor were excellent in normal subjects. This value also showed a strong positive correlation with Biodex. Therefore, we suggest that portable dynamometer for knee extensor can be used for measuring objective and quantitative knee extension strength in persons with a supine position.

Acknowledgment

Acknowledgements This study is funded by Korea Workers' Compensation and Welfare Service.

Fig. 1. Portable dynamometer to measure knee extension strength in a supine position.

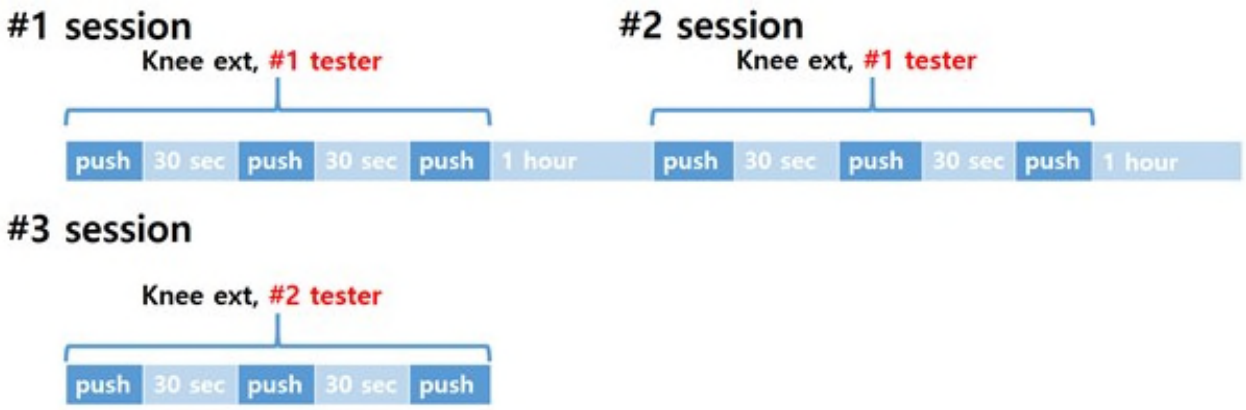

Fig. 2. Study protocol to evaluate the intra-rater and the inter-rater reliability of portable dynamometer for knee extensor