FIGUR8

September 15, 2019

Investigation of the Inter-Tester Reliability of sMMG Sensor Output

Quadriceps

Shannon Linderman, MS, MA

Thomas Chiang, BA

Hannah Stein, BS

Donna Moxley Scarborough, PHD, MS, PT

Copyright © 2019 FIGUR8, Inc.
All rights reserved.

The information contained in this document is the proprietary and exclusive property of FIGUR8, inc. Except as otherwise indicated. No part of this document, in whole or in part, may be reproduced, stored, transmitted, or used for design purposes without the prior written permission of FIGUR8.

The information in this document is provided for informational purposes only. FIGUR8 expressly disclaims all warranties, express or implied, including without limitation those of merchantability, fitness for a particular purpose and noninfringement.

Table of Contents

Purpose 1

Methods 1

Results 1

Conclusions 2

Purpose

This study evaluated the inter-tester reliability of lower extremity muscle output collected from surface Mechanomyography (sMMG) sensors.

Methods

Twenty subjects (27.6 ± 9.61 years) participated in two testing sessions. In both sessions, sMMG sensors were placed bilaterally across the largest portion of the muscle bulk of the quadriceps. In session one, the sensors were placed on the subject by Tester 1. In session 2, the sensors were placed on the subject by Tester 2. In each session, the subject performed three trials of a bilateral deep squat (BDS) activity (Figure 1).

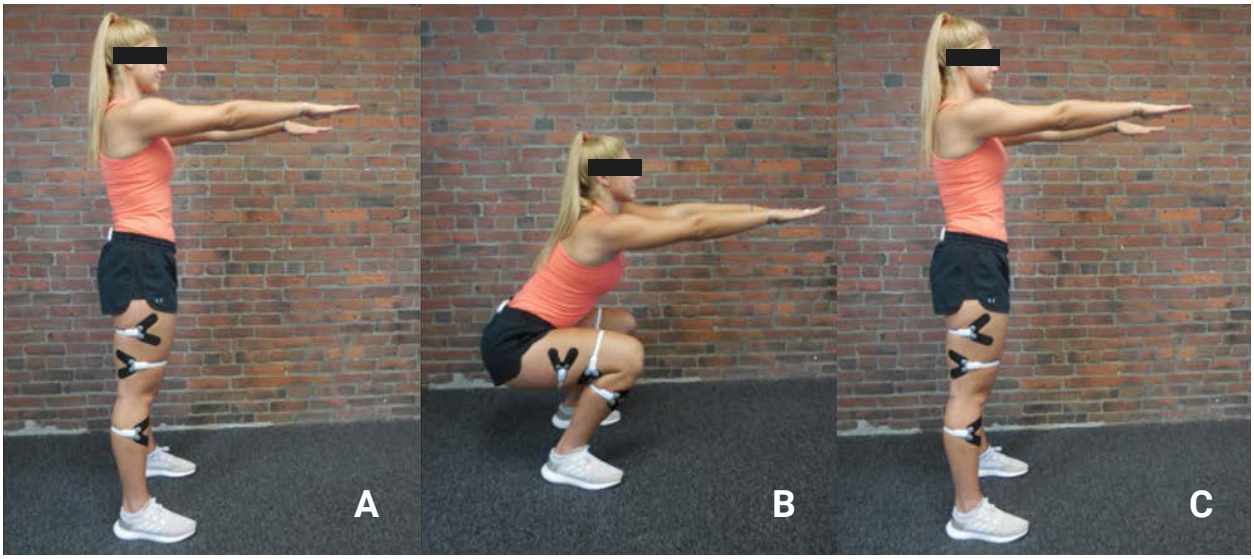

Figure 1. *Sagittal view of start (A) midpoint (B) and return to start (C) positions of the bilateral deep squat.*

Peak muscle displacement was recorded for the quadriceps during the BDS activity using sMMG sensors. Data was extracted for analysis from the third trial performed during each of the sessions If the third trial was not able to be used due to invalid data collection, the second or fourth trial was used. Statistical analyses included ICC 2-way mixed effects consistency model evaluation of inter-tester reliability.

Results

Peak quadriceps (n= 20) muscle displacement displayed good correlation during inter-tester reliability testing.

$ICC_{3,1}$= 0.825 (0.558 - 0.931), p < .0001

The average peak quadriceps muscle output during a squat activity with the same tester was 27.51 ± 7.22 mm for testing session 1 and 25.72 ± 6.52 mm for testing session 2.

Conclusions

The sMMG sensors demonstrated consistent detection of peak quadriceps muscle displacement with good inter-tester reliability for the magnitude of peak displacement during the squat task.

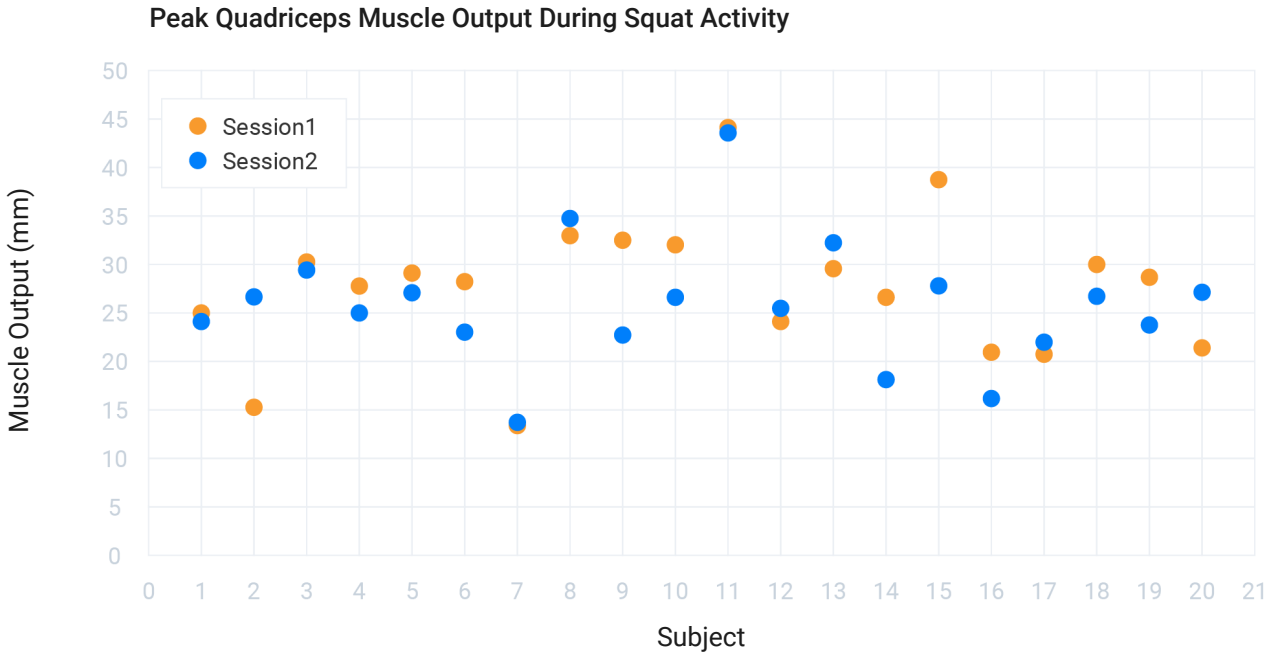

Figure 2. *Subjects' peak quadriceps muscle displacement during a squat activity across 2 testing sessions with different testers.*

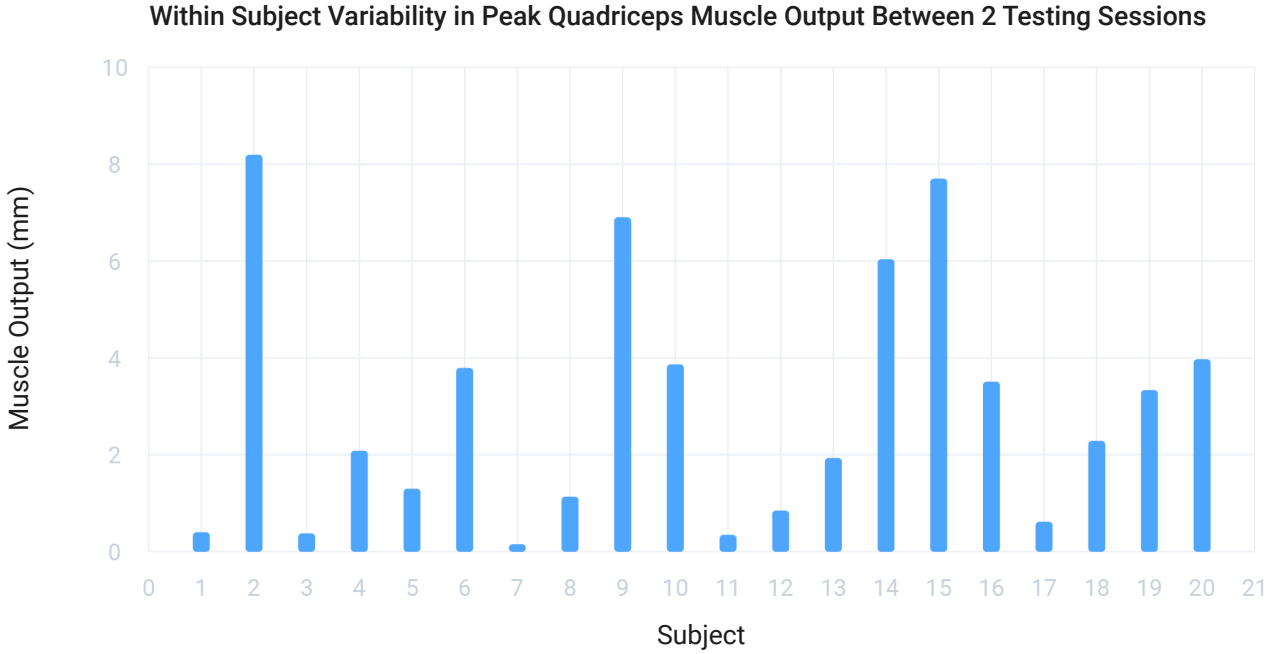

Figure 3. *Comparison of within-subject variability of peak quadriceps muscle displacement across 2 testing sessions with different testers.*

Copyright © 2019 FIGUR8, Inc.
All rights reserved.