



“The reliability of a video analysis system (*Siliconcoach*TM) and the universal goniometer in the measurement of lower limbs joints”

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INTRODUCTION

Throughout the rehabilitation process, adequate recording of joint range of motion (ROM) is essential to facilitate and evaluate the most appropriate treatment. The universal goniometer (UG) is the most common and inexpensive tool used in clinical settings to record ROM. However, a review of the literature examining the intratester reliability of the UG demonstrated considerable variation in results. The review highlighted the gap in current research about the intratester reliability of the UG and the necessity of introducing a more reliable measuring tool (Boone et al., 1978, Stuberg et al., 1988, Herrero et al., 2011).

This research investigated the intratester reliability of the *Siliconcoach*TM video analysis system compared to the UG in measuring passive ROM of the lower limb joints amongst healthy candidates.

METHOD

Three testers and eight healthy participants were included in this study. Sagittal plane motion of the hip joint, knee joint and ankle joint of the dominant leg was measured with both tools. Testers were provided with instructions manual for measurements procedures. Additionally a training session for the use of the *Siliconcoach*TM was arranged. Each tester repeated each measurement three times using each tool to calculate intratester reliability. Intraclass correlation coefficient (ICC) and Bland-Altman plot (difference plot) were used to calculate intratester reliability. ICC values above 0.60 were considered to be satisfactory for research purposes (Evers, 2001).

RESULTS

In this work, ICC values for *Siliconcoach*TM for all the joints measured were found to range from (0.24 to 0.98). ICC values for *Siliconcoach*TM for ankle dorsiflexion for all the testers were found to be lower in comparison to the other motions measured and below the satisfactory limits (<0.6). Additionally, ICC value for one tester for hip extension was found to be lower than the satisfactory limits (0.53). The highest ICC values for *Siliconcoach*TM for all the testers were found for hip flexion measurements. On the other hand, ICC values for UG across all the joints measured were found to vary widely from (0.39 to 0.93). The lowest ICC value for UG was found for ankle dorsiflexion for one tester while the highest was found for ankle plantarflexion for one tester.

DISCUSSION

In general, ICC values for *Siliconcoach*TM were found to be higher, and therefore more reliable, than UG. All ICC values obtained using *Siliconcoach*TM excluding one testers value for hip extension measurements and ankle dorsiflexion measurements for all the testers were found to be above the satisfactory limit (>0.60) with small variations in the values, which demonstrates the reliability of using this tool for specific joint motions measurements. In addition, it was shown in this work that all ICC values for UG across all the joints measured ranged considerably, and in some of these measurements the values were below the satisfactory limits (<0.60). This demonstrates the unreliability of using this tool in comparison to *Siliconcoach*TM for specific joints motion.

CONCLUSION

In conclusion, *Siliconcoach*TM was found to be more reliable than UG in measuring passive Sagittal motion ROM of specific lower limb joints motion which included, hip flexion, knee flexion, knee extension and ankle plantarflexion.

CLINICAL APPLICATIONS

The present work opens up new possibilities for using advanced technology in joint ROM measurements to achieve more reliable and repeatable measurements. *Siliconcoach*TM is an applicable clinical tool which is easy to use in a clinical situation.

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