

Inter and Intra-rater analysis of hemiparetic shoulder through the Physioplay: a range of motion assessment software.

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Introduction: The cerebrovascular accident (CVA), also known as stroke, is one of the main causes of death and limitations in adults¹. Motor, sensory and cognitive impairments are observed². An important somatosensory subsystem involves the proprioception which if impaired may alter the *feedback* and the therapy progress, negatively impacting the range of motion (ROM) ¹. The most common instrument used to assess ROM is the universal goniometer. Its usage requires experience from the therapist in order to reduce measurement errors. The data is manually recorded which makes it even more difficult to process the information and furthermore, it gives little to non-*feedback* to the patient. With the invention of movement sensor equipment, such as *Kinect*, *exergames* have been developed, which are games that consist in the physical interaction of the players with the virtual environment. Therefore, the purpose of the study was to evaluate the reliability of the inter and intra measurement-raters of the shoulder abduction ROM in post-stroke patients, through the *exergame PhisioPlay*, which is a software developed by the UNIFAL-MG that gives a visual *biofeedback* to the patient allowing the interaction between patient and virtual reality to happen through the performance of movements lead by stimuli generated on the screen. **Materials and Methods:** 13 volunteers diagnosed as chronic post-stroke patients, participated in this study, age range of 58,23±9,96 (male and female). The evaluation was conducted by two physical therapists where goniometry of the shoulder and the *exergame PhisioPlay* were done. The collected data were obtained through a report that was generated at the end of each session, showing all the angles captured during the game. After one week the follow-up test was done. The *Statistical Package for the Social Science* (SPSS, v. 20.0) for *Windows* was used for statistical analysis. The agreement of the intra and inter-rater results for the use of the *PhisioPlay* software was analyzed using the Intraclass Correlation Coefficient - Type_{1,1} and Type_{1,2} – (CCI). *Shapiro Wilk* test was used for the maximal measurements found in the goniometry and in the *PhisioPlay*, the calculated variables were correlated using the *Pearson's* Correlation. The alpha level (α) was set at 0,05. **Results:** The analyses demonstrated that the inter-rater and intra-rater reliability through the CCI was high ($r>0,90$) for all the obtained variables ($p<0,05$). The *Pearson's* Correlation results for the maximal goniometry and *PhisioPlay* measurements showed a high correlation ($r>0.90$). **Discussion:** As stated by the previous literature, the *Kinect* shows to be an accurate and precise tool to assess the human movement in general, as well as in the upper extremity, proving to be an important tool to assess ROM³. In this study, the ROM dynamic evaluation done through the *PhisioPlay*, was able to record the active movements performed by the patient from the beginning to their maximal efforts, supporting the efficacy of this software when compared to the universal goniometry. The *exergame* through *PhisioPlay* allow the evaluation process to be more dynamic due to the set goals offered by the game and due to the visual *biofeedback* which also helps with achieving the correct movement performance. **Conclusion:** In conclusion, the *Kinect* in association with the *exergame PhisioPlay* is a reliable tool in assessing the ROM in a fast, simple, cost beneficial manner, with minimal variation in the data collection.

References: [1] doi.org/10.1371/journal.pone.0170368; [2] Cavalcante, T.F et al., Rev Esc Enferm USP 2011; 45(6):1495-1500; [3] doi.org/10.1016/j.gaitpost.2016.04.004.