

ABSTRACT

Title: Evaluation of the range of motion of the upper limbs using the OpenPose program

Objectives: The aim of the work was to determine whether it is possible to use the OpenPose program as a tool for measuring upper limb range of motion, highlight OpenPose limits and consider whether the program could be used for evaluation in clinical practise or as part of telerehabilitation in the future.

Methods: 48 probands participated in the research. Participants were intentionally selected from healthy population due to the nature of the work. Each participant was measured in 6 different positions while lying on a lounger. Measurements were taken bilaterally. A total of 14 different angles of shoulder and elbow were measured. These were maximum flexion of the elbow joint, flexion of the arm with flexion of the elbow, flexion of the arm, internal and external rotation of the arm and extension of the arm. Data were collected using a standardised examination method using a goniometer and a video recording. Video recordings were later used in the OpenPose program for angle evaluation. Finally, the results of both methods were compared.

Results: 8 out of total 14 measured angles of shoulder and elbow were excluded based on evaluation criteria. Values with average difference between both examiner's results higher than 5 degrees and values where OpenPose failed correct detection criteria on more than 10 % of measurements were excluded. For resulting 6 measured angles the measurements of goniometric method and OpenPose were compared. Only confirmed hypothesis, where difference between measurements didn't exceed 5 degrees, were arm extension and internal arm rotation.

Key words: evaluation of Range of motion, OpenPose, goniometry