RESUMO

With increase in the average life expectancy around the globe, instigated by the accelerated development of new quality of life technologies, have contributed to a rapid increase in the elderly population. With these changes it is made necessary the development of new accessibility technologies. One of the challenges the elderly population faces is a simple and necessary: sit and stand, technically known as the STS cycle (sit-to-stand and stand-to-sit). The functional capacity to carry out these movements, especially standing, is one of the most important in the life of an individual, since it is precursor to the realization of fundamental daily activities such as walking. In addition, this capacity is directly linked to the condition of autonomy and independence of a person also affecting formal and/or informal caregivers, which often suffer injuries during transfer task practices. This cycle can be affected by many pathology common with age, these can weaken the muscles or cause further injuries that hamper the subjects movement. Therefore elderly people with displacement difficulty become increasingly dependent on caregivers to perform this cycle undermining their autonomy and impacting their quality of life. Considering the impact that this cycle has on the individuals autonomy and quality of life the present study aims to assess the impact of an assistive device, that works coupled with a chair allowing vertical elevation and antero-posterior tilt, when executing the STS movement (sit-to-stand). Thus, it is intended to compare, through experiments and numerical simulations, the torques in the joints of the ankle, knee and hip, vertical forces and VGRF (vertical ground reaction forces), the displacement of the individual’s center of mass (CoM) and the trunk flexion angle. At the same time the data obtained will be compared with other studies related to the movement. To this end a biomechanical kinemetry method was used for the movement evaluation. A two-dimensional virtual human model was developed through segmented ergonomic video analysis and the data obtained were numerically simulated to measure the inertial forces and torques of the complete execution of the STS movement. The device allows a vertical elevation of 0 to 400 mm and an anterior slope of up to 25°. A prototype was used to compare the movement with and without the assistive device. As a result, the torques in the lower limbs’ joints and the vertical ground reaction forces were reduced by up to 60% and 23%, respectively. There was a reduction of up to 37° in the maximum trunk flexion angle during the cycle. The horizontal displacement of the center of mass was reduced by up to 70%.