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# **KINEMATIC ANALYSIS OF SITTING PIVOT TRANSFER IN INDIVIDUALS WITH PARAPLEGIA**

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## ABSTRACT

**Purpose and Background :** Wheelchair transfers are fundamental to SCI individuals for their functional independence, with SPT being the most frequently used. The success of a transfer rely upon the basis of appropriate kinematics of upper limbs and trunk. These upper limb and trunk movements help the individual to position themselves for appropriate for transfer leading to safer execution. Thus, transferring in a community environment makes it challenging for the individual accounting the environmental constraints. Therefore, a kinematic analysis of SPTs is carried out in the community rehabilitation setup, to understand the different movement patterns and startegies adopted by these individuals.

**Methods :** An observational study was conducted where the SCI individuals were asked to perform SPT between the wheelchair and bed, both being of same height. The individual was asked to perform the transfer at their self- selected pace and using their own strategy. Reflective markers were placed on the specified bony landmarks over the limbs and trunk. The individual were given practice trials and were asked to perform SPT four times with adequate rest periods. The transfers were recorded using two camera from the A-P and lateral view each. The data recorded was then analyzed according to the transfer phases – pre-lift, lift, post -lift phase using the Kinovea software. The kinematic parameters at the bilateral shoulder elbow, wrist joint, trunk were noted with the duration of transfer.

**Results :** Bilateral shoulder joints moved in the mid-range arc of motion, with role of providing stability. A complete arc of motion was noted for bilateral elbow joints with wrists exhibiting extreme motions. Trunk flexion was noted for most part of the transfer. A correlation coefficient established between the strength of leading-trailing limb muscles, trunk kinematics with the transfer duration. A significant moderate negative correlation for leading shoulder internal rotators and trailing shoulder extensors,

adductors and elbow extensors. The trunk inclination during the pre-lift phase showed a significant moderate positive correlation with the total transfer duration.

**Conclusion :** We conclude that both leading and trailing limbs contribute substantially to the transfer task. A complete arc of movement at the elbow and extreme extension motion is required when executing a SPT. The shoulder requires a initial to mid-range of motion accompanied with considerable strength of the scapular and upper limb muscles. The duration of transfer showed an significant association with the trunk inclination during the pre-lift phase and strength of leading shoulder internal rotators, trailing shoulder extensors, adductors and elbow extensors.

**Keywords :** Spinal cord injury, Paraplegia, Kinematics, Sitting pivot transfers, SPTs.