



**Service Priorities and Programmes**  
**Electronic Presentations**

**Convention ID:** 580

**Submitting author:** Miss Wai Fan WONG

**Post title:** Physiotherapist II, PWH, NTEC

**Pilot reliability study of three-dimensional motion analysis on simplified integrated step test in normal individuals**

*Wong WF(1), Pang CY(1), Lui SY(1), Yeung KC(1)*

*(1)Physiotherapy Department, Prince of Wales Hospital*

**Keywords:**

Simplified integrated step test

Reliability

3D motion analysis

Stair

Vicon

**Introduction**

Stair climbing is an important functional daily activity. Three-dimensional (3D) motion analysis in stair climbing was reported in published studies. However, replicating a staircase in gait analysis laboratory may not be feasible and the corresponding 3D motion analysis is too complex. Aiming to mimic stair climbing, a simplified integrated step test (SIST) is proposed. Subjects are required to perform stepping-over action, which includes lower limbs concentric and eccentric control. SSIT was tested to be valid in discriminating difference in lower limbs kinematics between normal and osteoarthritic knee patients (details submitted in another paper, HA Convention 2018). This preliminary study is to evaluate the reliability of 3D motion analysis on SSIT.

**Objectives**

To determine the between-session reliability of 3D motion analysis in normalized vertical ground reaction force (NVGRF) and kinematics of lower-extremity with SIST on normal subjects.

**Methodology**

Subjects without lower extremity pathology were included in this study, carried out in the physiotherapy department of Prince of Wales Hospital. Subjects were instructed to place the testing leg on an 8-inch block, followed by the contralateral leg crossed over and landed on the floor force plate with total 5 successful trials for each side. VICON(TM) system was used to measure and analyze the kinematic peak angles (PA) of hip, knee and ankle in sagittal, coronal and transverse plains with reference to static alignment. The NVGRF was measured with the Bertec(TM) force plate. Procedures were repeated approximately 1 week later. The mean values of PA, and NVGRF were analyzed by SPSS to review the between-session reliability. Method of mean substitution was used to handle any missing data.

**Result**

6 subjects were recruited (mean age=33.3; s.d.=9.9; Male: Female= 1:2). At least good between-session reliability was found in NVGRF (ICC (3,2)=0.945), peak

hip-flexion (ICC (3,2)=0.758) and knee-flexion (ICC (3,2)=0.781). Moderate reliability was found in peak knee-adduction, knee-internal rotation, ankle-dorsiflexion and ankle-internal rotation with ICC (3,2)=0.582 to 0.735. Hip-internal rotation and ankle-adduction showed poor reliability with ICC (3,2) 0.006 and 0.16 respectively. Overall 5.42% data was applied with the method of mean substitution. Clinical implication NVGRF and kinematic variables showed at least moderate between-session reliability except hip-internal rotation and ankle-adduction. This newly introduced SIST may be potentially contributive in identifying motion fault during stair climbing so as to facilitate rehabilitation process. Small sample size may limit the statistical power of this pilot-study and further study is recommended.