Introduction: Diabetic neuropathics (DN) gait disorders are often attributed either to muscles interfering with locomotors function or to muscles being prevented from performing their proper actions. This study investigates the influence of the method applied to joint kinetics calculation on describing the effect of peripheral neuropathy (PN) on gait in diabetic patients.

Methods: Kinematics, kinetics and surface EMG data of 20 subjects (10 normal and 10 DN) have been collected by means of 6 cameras BTS Srl. motion capture system (60–120 Hz) and surface EMG (PocketEMG, 16 channels) synchronized with 2 Bertec force plates (FP4060-10). A fullbody marker set [1] was used to collect kinematics data. Gait analysis and stair ascending and descending test were performed. At least 3 trial per subject were acquired (during gait analysis 3 trial with right contact and 3 with left on the force plates). Joint moments were calculated as the vector product of the position vector of the joint centre and the collected ground reaction force, and by means of two inverse dynamics approach. In both cases [2,3] Newton–Euler formulation was applied from the feet segments to the last segment of the kinematic chain (eight rigid segments and both sides right and left: pelvis considered as a rigid segment, spine and head both in Posture and in Gait analysis. With the analysis of averaged behaviour of Posture or Gait, the final evaluation of the clinical status of the patient relies on several 3D trials measurements. Such a circumstance improves the statistical reliability of the evaluation allowing to overcome the single “Best Trial” analysis limits permitting to obtain information about the repeatability and variability of the performed motor task. These latter could add important insight about CNS behaviour for both healthy and pathological motor control. This feature yield the possibility to make robust statistical comparisons both intra-individual and inter-individual to monitor the results of therapy along time and/or the evolution of the pathology. Hundreds of patients with different posture and movement disorders have been analysed with this approach at our Posture and Gait lab. The provided quantitative outcomes allow both to identify and precisely differentiate pathological patterns and to focus clinician attention to statistically different variables, proving its usefulness in clinical and rehabilitation field. The collection of Posture and Gait characteristics in healthy subjects using the described approach is actually in progress to build up a “Normal Population” data base.

Reference


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Introduction: Diabetic neuropathics (DN) gait disorders is influenced by the computational technique adopted in joint rotation moment estimation? Z. Sawacha 1,*, G. Guarneri 2, F. Mojentale 1, A. Avogaro 2, C. Cobelli 1

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Diabetics subjects kinetics is influenced by the computational technique adopted in joint rotation moment estimation?

Fig. 1. DN subjects ankle inertial moments during gait.

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References

