

CLASS-SPECIFIC BIOMECHANICAL CHARACTERISTICS OF DOUBLE POLING IN ELITE PARALYMPIC NORDIC SIT-SKIERS

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INTRODUCTION: Spinal cord injury people and others (e.g. amputees), showing different impairments, are participating in the same Paralympic Nordic sit-skiing race. A used classification system (5 groups; LW10-10,5-11-11,5-12) based on classification tests, trying to consider the athletes' impairment and functional potential, should provide fair competitions with using a corresponding time percentage system (1). Defining clear disability criteria and a basis to classify athletes grounded on their individual functional limitations, demands for better sit-skiing specific empirical evidence as the established class distribution may leave room for interpretations (2). While classification lab tests improve (3), the sport-specific functional differences during sit-ski double poling on snow in athletes with different impairments are not fully understood with a lack of studies (4). As part of a larger project, the aim of this study was to biomechanically examine sit-ski double poling on snow at different terrains and speeds. **METHODS:** 17 (13 male; 4 female; 7 nations) elite sit-skiers (LW10-LW12) volunteered during on snow skiing in the Vuokatti Ski tunnel on flat and uphill (3°) terrain at different speeds (flat/uphill 4.5/4m/s-90%vmax-vmax). A kinematic 2D video analyses (50Hz) was performed (3 video cameras in series perpendicular to track; recording in sagittal plane) and videos were analyzed using the APAS-System (Ariel Dynamics Inc., USA), with main focus on trunk, elbow, hip and pole angle variables. Forces (1000 Hz) were measured by a custom made light-weight pole force system (University of Salzburg/Jyväskylä, AUT/FIN). **RESULTS:** Results for different classes are presented mainly descriptive (small N) for flat terrain at 4.5 m/s and v_max. Trunk angle characteristics (e.g. ROM_flex/ext, T_{Amin}, T_{Amax}) were not clearly discriminating all classes from each other, while e.g. LW10 showed an early backwards movement (upper body extension) during poling vs. a clear trunk flexion-extension pattern in LW 12 for a more efficient force production, connected to smaller pole angles to the ground. Elbow angle patterns showing the stretch-shortening cycle characteristics were individual (flexion vs. no flexion) and different between LW10 and 12, but not always discriminating classes. **DISCUSSION/CONCLUSION:** The small number of skiers in some classes makes the interpretation difficult and partly vague. From a sit-ski specific functional point of view not all used classes can be clearly discriminated from each other and the influence of impairment on force production and performance has to be further investigated in a bigger group of sit-skiers.

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