

KNEE KINEMATICS DURING WALKING ASSOCIATE WITH SYMPTOMATIC PAIN IN INDIVIDUALS WITH KNEE OSTEOARTHRITIS

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Introduction: Knee osteoarthritis (KOA) is one of the leading causes of pain and disability worldwide [1]. Symptomatic KOA in particular can yield aberrant compensations and avoidance behaviors that may be further detrimental to knee joint health. The purpose of this study in n=15 individuals with KOA was to quantify preliminary associations between self-reported pain/function and three potential kinematic biomarkers of knee joint function during walking – namely, knee flexion angle (a feature of ‘stiff-knee’ gait), knee angular acceleration (a surrogate for joint torque), and knee angular jerk (a feature of “smoothness”). We hypothesized that higher self-reported pain would associate with lesser peak knee flexion, knee angular acceleration, and knee angular jerk.

Methods: 15 adults with mild-to-moderate KOA (7M/8F; mean \pm standard deviation; age: 66.6 ± 7.5 years; BMI 26.6 ± 3.3 kg/m²) completed the Western Ontario and McMaster Universities Arthritis Index (WOMAC) and Knee Injury and Osteoarthritis Outcome Score (KOOS) surveys. Subjects then completed a 2-min treadmill walking trial in which we collected 3D motion capture to quantify stance phase knee flexion and sagittal plane knee angular acceleration and jerk.

Results & Discussion: Higher self-reported WOMAC pain scores were significantly correlated with lesser midstance knee flexion ($p=0.048$, $r=-0.535$) and a lesser early stance phase knee angular acceleration ($p=0.033$, $r=-0.571$).

Significance: These findings support our hypothesis and point to knee-specific markers that may be: 1) linked to avoidance strategies in symptomatic KOA, and 2) opportunistic for wearable sensing and remote monitoring.

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References:

[1] Murray et al. 2013 [2] Murphy L et al. 2008