

non-responders were classified if their EKAM increased when wearing both lateral wedges compared to the control shoe. Difference in pain compared to the control shoe was assessed using a Wilcoxon sign rank test; change in EKAM was assessed using 95% CIs constructed around the mean EKAM change. Finally, Spearman's rank correlation was used to assess if the change in the pain rankings related to the change in EKAM.

Results: We studied 70 participants (43 male, 27 female). Overall (N=70), pain was reduced when using both types of lateral wedge insole (Wedge Average $z = -3.63$, $p < 0.001$; Boston $z = -2.24$; $p = 0.03$; Salford $z = -4.32$; $p < 0.001$) in comparison to the control shoe. EKAM also reduced when using a lateral wedge insole in comparison to the control shoe. Participants' biomechanical response to wearing both types of lateral wedge insoles varied considerably with 20% (n=14) of participants demonstrating an increase in EKAM (median change in EKAM 0.028Nm/kg; IQR 0.011Nm/kg to 0.047Nm/kg) and 54% (n=38) demonstrating a decrease in EKAM (median change in EKAM -0.044Nm/kg; IQR -0.063Nm/kg to -0.025Nm/kg). The remainder had inconsistent EKAM responses to the wedges. We found no significant relationship between reduction in EKAM and reduction in pain in wedges ($R = -0.14$; 95% CI -0.36 to 0.10), or for either wedge separately (Boston $R = -0.013$; 95% -0.25 to 0.22); Salford $R = -0.21$; 95% CI -0.43 to 0.03). Similarly, pain reduction did not differ between responders and non-responders, again either for the wedges on average (N = 52, $z = 0.39$ for difference between responders and non-responders, $p = 0.69$), for the Boston (N = 52, $z = -0.36$, $p = 0.72$), or the Salford wedge (N = 52, $z = -0.11$, $p = 0.92$).

Conclusions: Our findings demonstrate that the degree of reduction in EKAM using lateral wedge insole does not correlate at all with immediate pain reduction with use of these insoles. Even those who have substantial reductions in EKAM when using the insole do not experience any more pain reduction than those without any EKAM reduction. This suggests that modestly reducing the EKAM may not reduce knee pain in persons with knee OA when assessed immediately after prescription.

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ASSOCIATIONS BETWEEN KNEE EXTENSOR POWER GENERATION AND USE

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Impairments in functional ability are associated with quadriceps weakness in patients who undergo total knee arthroplasty (TKA). We examined the association between dynamic quadriceps strength capacity (maximal knee extensor power) and knee extensor power generated during a functional task to further understand the relation between quadriceps strength and its role in performing routine daily activities.

Purpose: The purpose of this investigation was to evaluate the relationship between peak knee extensor power generated with the surgical limb when rising from a chair and the maximal knee extensor power during isokinetic and isotonic tests.

Methods: Twenty patients (women=8; men= 12; 67.5 ± 9.1 yrs) were tested 6 months after undergoing unilateral TKA. Subjects participated in 3 dimensional motion analysis of a sit-to-stand task. Start position was standardized by adjusting the seat height and foot position so knee and foot angles were symmetrical. Peak knee extension power, knee joint angles at peak power, and knee joint angular velocity at peak power were determined. Subjects also completed a muscle power assessment on an electromechanical dynamometer, including isokinetic trials at three velocities (60, 90, and 120 deg/s) and isotonic trials using 3 body mass equivalent resistances (20, 30, 40% total body mass).

Results: The associations between peak knee extensor power generated during the standing phase of a sit-to-stand task and the peak power produced during isokinetic (60 deg/s $r^2 = 0.336$; 90 deg/s $r^2 = 0.265$; 120 deg/s $r^2 = 0.305$; $p < 0.05$ for all three velocities) and isotonic (20% $r^2 = 0.185$; 30% $r^2 = 0.322$; 40% $r^2 = 0.445$; $p < 0.05$ for 30 and 40 pct loads) contractions were fit by positive linear regression (Figure 1). The average knee extensor velocity when peak power generation occurred during standing was 85.6 ± 17.6 deg/s. The average knee joint angle at this time point was 57.2 ± 5.8 degrees of knee flexion. For comparison, the association between peak power generated when standing and static knee extensor strength (maximal voluntary isometric contraction) was $r^2 = 0.328$; $p = 0.016$.

Conclusions: Peak power generated when rising from a chair was positively related to the peak power produced during both isokinetic

and isotonic knee extensor contractions, such that those individuals who generated greater power with the surgical limb when standing from a chair also exhibited greater peak power generating ability. The relations between power generation during standing and dynamic measures of strength are comparable to that of static measures. The strongest relationship between peak power during standing and knee extensor strength was observed with the isotonic contractions with the 40% body mass resistance. These findings suggest that measures of dynamic strength may provide important insight to clinicians regarding the role and importance of the knee extensors in performing daily activities, such as rising from a chair.

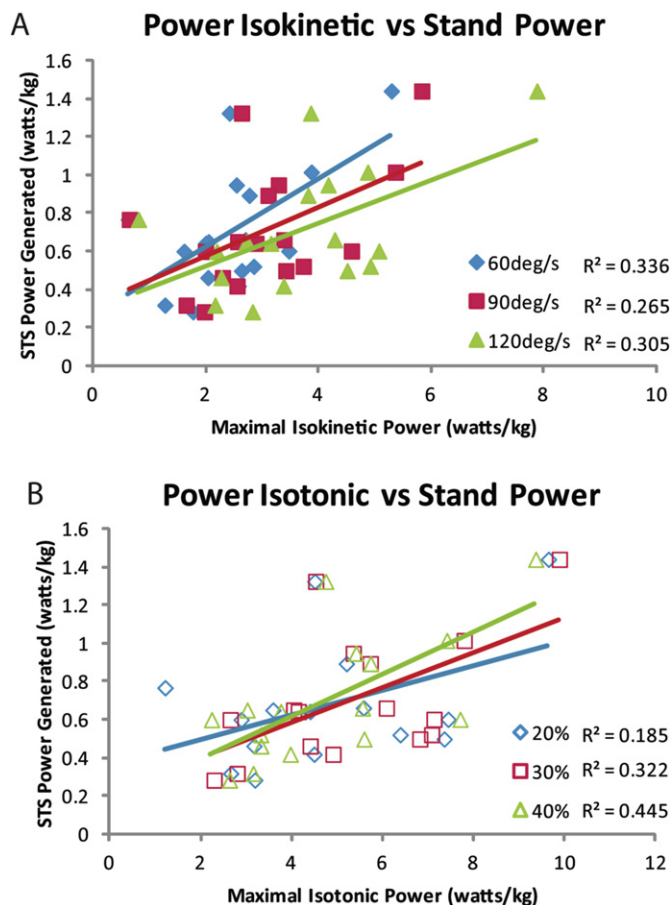


Figure 1. The associations between normalized peak power generation during the standing phase of a sit-to-stand task (STS) and the normalized peak power generated by the knee extensor during isokinetic (A; 60, 90, and 120 deg/s) and isotonic (B; 20, 30, and 40% equivalent inertial body mass) contractions.

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ASSESSMENT OF THE EFFECT OF AN OFF-THE-SHELF REALIGNING BRACE ON TIBIOFEMORAL CONTACT STRESS

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Purpose: Elevated regional tibiofemoral contact stress has been found to predict subsequent development of symptomatic and progressive knee osteoarthritis (OA), as well as worsening of bone marrow lesions, cartilage morphology and pain. The purpose of this study was to determine the degree to which focally elevated knee joint contact stress can be reduced by using a brace to offload the area of the joint at greatest risk for worsening, testing the hypothesis that non-invasive estimates of mean and maximum articular surface contact stress are lower in the tibiofemoral compartment affected by OA when wearing the brace than when not wearing the brace.

Methods: Fifteen volunteers with unicompartmental tibiofemoral OA underwent weight bearing radiographic imaging (EOS Imaging) with