

Associations of Leg length Inequality With Prevalent, Incident, and Progressive Knee Osteoarthritis

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FROM ABSTRACT:

Background—Leg length inequality is common in the general population and may accelerate development of knee osteoarthritis.

Design—Prospective observational cohort study.

Patients—3,026 subjects, age 50–79, with or at high risk for knee osteoarthritis.

Measurements—The exposure was leg length inequality measured from full limb radiographs.

The outcomes were prevalent, incident, and progressive knee osteoarthritis [radiographs and symptoms].

Results—Leg length inequality ≥ 1 cm was associated with prevalent radiographic (53% vs. 36%) and symptomatic (30% vs. 17%) osteoarthritis in the shorter limb.

Inequality ≥ 1 cm was associated with incident symptomatic osteoarthritis in the shorter (15% vs. 9%) and longer (13% vs. 9%) limb.

Inequality ≥ 1 cm was associated with increased odds (29% vs. 24%) of progressive osteoarthritis in the shorter limb.

Conclusions—Radiographic leg length inequality was associated with prevalent, incident symptomatic and progressive knee osteoarthritis.

These results point to leg length inequality as a potentially modifiable risk factor for knee osteoarthritis.

KEY POINTS FROM AUTHORS:

1) Leg length inequality is very common, occurring in up to 70% of the population.

- 2) This study used 3,026 subjects age 50-79 years that were reassessed at a 30-month follow-up. This study is the first longitudinal evaluation of leg length inequality and radiographic knee osteoarthritis in a large cohort.
- 3) Leg length inequality is implicated in medical conditions, including low back pain, trochanteric bursitis, osteoarthritis of the hip and knee, knee pain, and running injuries such as Achilles rupture.
- 4) Radiography is the gold standard for measurement of leg length inequality.
- 5) "Since a shorter limb has to come from a higher level to reach the ground during walking, it is likely that a shorter limb would also incur an increased ground reaction force compared with a situation without leg length inequality."
- 6) "There was an association between leg length inequality and prevalent radiographic and symptomatic knee osteoarthritis after controlling for age, sex, height, body mass index and alignment."
- 7) "Leg length inequality of ≥ 1 cm was associated with increased odds of having knee radiographic osteoarthritis in the shorter limb (53% vs. 36) compared to those with leg length inequality < 1 cm."
- 8) "A leg length inequality of ≥ 2 cm, was associated with even greater odds of having radiographic knee osteoarthritis in the shorter limb (68% vs. 37%)."
- 9) "There results demonstrate that leg length inequality as small as 0.5 to 1cm increased the risk of prevalent knee osteoarthritis, primarily in the shorter limb."
- 10) "Leg length inequality of ≥ 1 cm was associated with 1.3 times the odds of having progression in the shorter limb [of osteoarthritis] over 30-months of follow-up compared to those with leg length inequality < 1 cm."
- 11) The authors "observed leg length inequality ≥ 1 cm in 14.5% of the study subjects at baseline, and this was significantly associated with prevalent radiographic and symptomatic osteoarthritis at baseline and predicted incident symptomatic knee osteoarthritis 30-months later."
- 12) In knees with radiographic osteoarthritis at baseline, shorter limbs were at high risk of x-ray progression. "These results suggest that leg length inequality may be an important risk factor for knee osteoarthritis. The results for prevalent knee osteoarthritis suggest that the risk is primarily in the shorter limb."
- 13) "Our results are not consistent with a previous biomechanical study which indicated that the longer limb exhibited increased ground reaction forces and therefore should be at greater risk for osteoarthritis."
- 14) This study confirms that the shorter limb is at greater risk of osteoarthritis.

15) "Leg length inequality is an important risk factor for both incident and progressive knee osteoarthritis."

16) "Those with leg length inequality $\geq 1\text{cm}$ were approximately 1.5 times more likely to develop symptomatic osteoarthritis over 30-months of follow-up." There is a small but significant risk of progressive knee osteoarthritis in the shorter limb.

17) "Leg length inequality as small as 0.5cm may be associated with increased odds of prevalent symptomatic osteoarthritis. This is the first prospective study to our knowledge to demonstrate the importance of leg length inequality of this small a magnitude as a risk factor for knee osteoarthritis. Nearly half of our study population exhibited this amount of leg length inequality."

18) "Physical examination may not provide sufficiently accurate or reproducible measurement of leg length inequality of 0.5cm."

19) "Although the risk associated with such a small degree of inequality may be minor, it is potentially correctible at low cost and with virtually no adverse effects."

20) "Leg length inequality may be under-recognized and under treated in subjects with knee osteoarthritis. Leg length inequality is easily corrected using shoe modifications, which brings up the intriguing possibility that correction of leg length inequality represents a potentially simple and cost effective method of treatment and prevention of knee osteoarthritis."

Most Important Points From Dan Murphy:

1) Measuring anatomical leg length difference during physical examination, without radiographs, is bogus and inaccurate.

2) This study looked at leg length by x-raying the legs and measuring the length of the bones of the legs (anatomical leg length difference); 70% of the population has legs that are not of equal length (anatomically).

3) A leg length difference (anatomical) of as little as 5 mm (6 mm is $\frac{1}{4}$ inch) is associated with increased incidence of short leg osteoarthritis, short-leg knee pain, and the progression of short leg osteoarthritis.

4) Shoe lift utilization of anatomical leg length inequality is cheap, practical and effective in both treating short leg knee osteoarthritis and in preventing it's progression.