

The Effects of Running on the Development of Knee Osteoarthritis: An Updated Systematic Review

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INTRODUCTION: It has been postulated by some that running increases the risk of knee osteoarthritis (OA), while others believe it actually serves a protective function. The purpose of this study was to determine the effects of running on the development of knee OA.

METHODS: A systematic review using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines was conducted using the PubMed, Cochrane, and Embase databases. The search terms used were: *knee AND osteoarthritis AND (run OR running OR runner)*. Studies that evaluated the effect of cumulative running on the development of knee OA or chondral damage based on imaging and/or patient-reported outcomes (PROs) were included. Data included the number of patients, age, gender, and follow-up time. Patients were evaluated based on plain radiographs, magnetic resonance imaging (MRI), and PROs.

RESULTS: Seventeen studies (6 level II, 9 level III, 2 level IV) met inclusion criteria, including 7,194 runners (mean age 56.2 years, mean follow-up 55.8 months) and 6,947 non-runners (mean age 61.6 years, mean follow-up 99.7 months). The overall percentage of males was 58.5%. There was a significantly higher prevalence of knee pain in the non-runner group ($p < 0.0001$) (Table 1). Although one study found a significantly higher prevalence of osteophytes in the tibiofemoral (TF) and patellofemoral (PF) joints within the runner group, multiple studies found no significant differences in the prevalence of radiographic knee OA or cartilage thickness on MRI between runners and non-runners ($p > 0.05$). One study found a significantly higher risk of knee OA progressing to total knee replacement (TKR) among non-runners (4.6% versus 2.6%, $p = 0.014$).

DISCUSSION AND CONCLUSION: Running is not associated with worsening of patient-reported outcomes or radiological signs of knee OA and may actually be protective against generalized knee pain and progression to TKR.

Table 1. Knee pain. Results are reported as knee pain/total number of patients within each group at latest follow-up.

Study	Runner	Non-Runner	p-value
Lo et al, 2018	33/123 (26.8%)	293/1,009 (29.0%)	0.61
Lo et al, 2017	274/775 (35.4%)	1,093/1,859 (58.8%)	< 0.0001
<u>Kujala et al, 1995</u>	23/117 (19.7%)	-	N/A
<u>Kujala et al, 1999</u>	27/264 (10.2%)	24/179 (13.4%)	0.30
Spector et al, 1996	27/81 (33.3%)	248/994 (24.9%)	0.096
Total	384/1,360 (28.2%)	1,658/4,041 (41.0%)	< 0.0001