

ASSOCIATION BETWEEN RUNNING VOLUME AND KNEE OSTEOARTHRITIS IN ADULT RUNNERS: A NARRATIVE REVIEW

ASSOCIAÇÃO ENTRE VOLUME DE CORRIDA E OSTEOARTRITE DE JOELHO EM CORREDORES ADULTOS: UMA REVISÃO NARRATIVA

ASOCIACIÓN ENTRE EL VOLUMEN DE CARRERA Y LA OSTEOARTRITIS DE RODILLA EN CORREDORES ADULTOS: UNA REVISIÓN NARRATIVA



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ABSTRACT

Knee osteoarthritis is one of the leading causes of functional disability in adults and older individuals and has traditionally been associated with progressive mechanical wear of the joint. However, current understanding recognizes the disease as a multifactorial process that affects not only the cartilage, but the entire joint unit, including subchondral bone, synovium, menisci, and ligaments. In this context, running remains surrounded by controversy, especially due to the belief that high training volumes could accelerate joint degeneration. Recent literature, however, suggests that this association is not consistently supported. Recreational runners show a prevalence of osteoarthritis similar to or even lower than that observed in non-runners, and even among marathon runners there is no robust evidence that cumulative running exposure alone determines a higher risk of joint disease. In addition, changes observed in cartilage after running appear to be predominantly transient, suggesting an adaptive response to mechanical stimulus rather than irreversible damage. In individuals with established osteoarthritis, self-selected running also does not appear to worsen symptoms or accelerate structural progression of the disease. The discussion of the findings indicates that running volume alone is a weak predictor of knee osteoarthritis, whereas factors such as age, elevated body mass index, family history, previous injuries, and joint surgeries exert a more relevant influence on the risk of degeneration. Thus, current evidence suggests that the impact of running on knee health depends less on mileage itself and more on the interaction between mechanical load and preexisting joint vulnerability.

Keywords: Knee Osteoarthritis. Running. Running Volume. Mechanical Load. Articular Cartilage. Adult Runners.

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RESUMO

A osteoartrite de joelho constitui uma das principais causas de incapacidade funcional em adultos e idosos, sendo tradicionalmente associada ao desgaste mecânico progressivo da articulação. Entretanto, a compreensão atual reconhece a doença como um processo multifatorial que compromete não apenas a cartilagem, mas toda a unidade articular, incluindo osso subcondral, sinóvia, meniscos e ligamentos. Nesse contexto, a corrida permanece cercada por controvérsias, especialmente pela crença de que volumes elevados de treino poderiam acelerar a degeneração articular. A análise da literatura recente, contudo, sugere que essa associação não se sustenta de forma consistente. Corredores recreativos apresentam prevalência de osteoartrite semelhante ou até inferior à observada em não corredores, e mesmo entre maratonistas não há evidência robusta de que a exposição cumulativa à corrida, por si só, determine maior risco de doença articular. Além disso, alterações observadas na cartilagem após a corrida mostram-se predominantemente transitórias, sugerindo resposta adaptativa ao estímulo mecânico e não dano irreversível. Em indivíduos com osteoartrite já estabelecida, a corrida autoselecionada também não parece agravar sintomas nem acelerar a progressão estrutural da doença. A discussão dos achados indica que o volume de corrida isoladamente é um preditor fraco de osteoartrite de joelho, enquanto fatores como idade, índice de massa corporal elevado, histórico familiar, lesões prévias e cirurgias articulares exercem influência mais relevante sobre o risco de degeneração. Assim, a evidência atual aponta que o impacto da corrida sobre a saúde do joelho depende menos da quilometragem em si e mais da interação entre carga mecânica e vulnerabilidade articular preexistente.

Palavras-chave: Osteoartrite de Joelho. Corrida. Volume de Corrida. Carga Mecânica. Cartilagem Articular. Corredores Adultos.

RESUMEN

La osteoartritis de rodilla constituye una de las principales causas de discapacidad funcional en adultos y personas mayores, y tradicionalmente se ha asociado al desgaste mecánico progresivo de la articulación. Sin embargo, la comprensión actual reconoce la enfermedad como un proceso multifactorial que compromete no solo el cartílago, sino toda la unidad articular, incluyendo hueso subcondral, sinovial, meniscos y ligamentos. En este contexto, la práctica de la carrera continúa rodeada de controversias, especialmente por la creencia de que altos volúmenes de entrenamiento podrían acelerar la degeneración articular. No obstante, la literatura reciente sugiere que esta asociación no se sostiene de manera consistente. Los corredores recreativos presentan una prevalencia de osteoartritis similar o incluso inferior a la observada en personas no corredoras, e incluso entre maratonistas no existe evidencia sólida de que la exposición acumulada a la carrera, por sí sola, determine un mayor riesgo de enfermedad articular. Además, los cambios observados en el cartílago tras la carrera parecen ser predominantemente transitorios, lo que sugiere una respuesta adaptativa al estímulo mecánico y no un daño irreversible. En individuos con osteoartritis ya establecida, la carrera autoseleccionada tampoco parece agravar los síntomas ni acelerar la progresión estructural de la enfermedad. La discusión de los hallazgos indica que el volumen de carrera aisladamente es un predictor débil de osteoartritis de rodilla, mientras que factores como la edad, el índice de masa corporal elevado, los antecedentes familiares, las lesiones previas y las cirugías articulares ejercen una influencia más relevante sobre el riesgo de degeneración. Así, la evidencia actual señala que el impacto de la carrera sobre la salud de la rodilla depende menos del kilometraje en sí y más de la interacción entre la carga mecánica y la vulnerabilidad articular preexistente.

Palabras clave: Osteoartritis de Rodilla. Carrera. Volumen de Carrera. Carga Mecánica. Cartílago Articular. Corredores Adultos.

1 INTRODUCTION

Knee osteoarthritis (OA) is currently recognized as the most prevalent joint pathology in the world, ranking as one of the main causes of functional disability in adults and the elderly (Dhillon et al., 2023). Historically, OA has been simplistically classified as a purely degenerative condition of cartilage, resulting from chronic mechanical wear and tear. However, contemporary understanding defines it as a multifactorial disease that affects the joint as a whole, involving inflammatory processes and changes in the subchondral bone, synovial membrane, menisci, and ligaments (Burfield et al., 2023; Dhillon et al., 2023).

In this scenario, the practice of running, a sport in rapid global expansion due to its cardiovascular, metabolic, and mental benefits (Hartwell et al., 2024; Coburn et al., 2023), remains surrounded by dogma that suggests that repetitive cyclical stress could accelerate joint collapse. The present narrative review seeks to critically analyze the relationship between running volume and knee health, investigating whether cumulative exposure to high mileage acts, in fact, as a predictor for the development or progression of osteoarthritis.

2 METHODOLOGY

The present study was conducted as a narrative review of the literature dedicated to the association between running volume and knee osteoarthritis in adult runners. The bibliographic search was carried out in the PubMed, Scopus and Google Scholar databases, using the descriptors "knee osteoarthritis", "running", "runners", "running volume", "training load", "mileage", "cumulative exposure" and "running history", combined using the Boolean operators AND and OR. Priority was given to studies written in English, available in full, with free access, and conducted in humans, which directly addressed the relationship between running and knee osteoarthritis. Complementary articles were added, mainly published in the last 10 years, with the aim of providing a theoretical, conceptual and epidemiological basis for knee osteoarthritis and running as a relevant health practice. Duplicate studies, experimental investigations in animal models, publications with no direct relation to the topic, articles focused on other joints, as well as studies predominantly focused on treatment or rehabilitation were excluded. The initial search identified 43 records. After reading the titles and abstracts, the potentially eligible studies were selected and then the duplicates were removed between the databases, resulting in six main studies included for analysis.

3 RESULTS

Recent scientific literature consistently demonstrates that the prevalence of osteoarthritis in recreational runners is lower than or comparable to that observed in non-

runners (Dhillon et al., 2023). Large-scale studies with marathon runners indicate a prevalence of diagnosed OA of approximately 7.3%, showing that long-distance practice does not necessarily induce pathological damage (Hartwell et al., 2024). Specifically with regard to training volume, the evidence refutes the existence of a deleterious dose-response relationship. Meta-analyses indicate that runners subjected to volumes greater than 48 km per week do not have a higher prevalence of OA compared to those who run less than 8 km weekly (Burfield et al., 2023). Similarly, the accumulated history of running, measured by the number of completed marathons or years of uninterrupted practice, is not a significant risk factor for joint pathology (Hartwell et al., 2024; Burfield et al., 2023).

In addition, MRI analyses reveal that after a running session, there is a transient reduction in cartilage thickness and volume (between 3% and 5%), accompanied by biochemical changes in T1rho and T2 relaxation times (Coburn et al., 2023). However, these markers return to baseline levels in short post-exercise periods, suggesting that cyclic loading facilitates the diffusion of nutrients from synovial fluid and stimulates processes related to chondral homeostasis (Burfield et al., 2023; Coburn et al., 2023).

In populations that already have established osteoarthritis, self-selected running demonstrates a robust clinical safety profile. Data from the Osteoarthritis Initiative indicate that regular practice does not accelerate the radiographic progression of the disease or aggravate painful symptoms (Lo et al., 2018).

Runners with OA are more likely to improve frequent pain and do not show worse structural evolution when compared to non-runners with the same clinical condition (Lo et al., 2017; Lo et al., 2018).

4 DISCUSSION

The critical interpretation of these results indicates that running volume, in isolation, is a weak predictor for joint health when compared to systemic and traumatic variables. The main risk factors for the development of OA in runners are advanced age, high body mass index (BMI), family history, and, crucially, the presence of previous knee injuries or surgeries (Hartwell et al., 2024; Dhillon et al., 2023).

The occurrence of previous joint trauma, such as anterior cruciate ligament reconstructions or meniscectomy, alters the biomechanics and load distribution, making the joint more vulnerable to the development of degeneration (Hartwell et al., 2024; Coburn et al., 2023).

Occasional divergences in the literature, which occasionally suggest increased risks in elite or ultra-high-volume competitive athletes, can be attributed to self-selection bias or

exposure to extreme training intensities that exceed tissue repair capacity (Burfield et al., 2023; Coburn et al., 2023). However, for the adult recreational runner, the mechanical load imposed by running seems to be within a biological safety threshold. Cyclic movement favors joint lubrication and cartilaginous nutrition, while sedentary lifestyle and immobilization are known to be deleterious to chondral tissue (Dhillon et al., 2023; Burfield et al., 2023). Thus, the risk of degeneration does not lie simply in the act of running or the mileage traveled, but in the interaction between the applied load and the pre-existing vulnerability of the joint.

5 CONCLUSION

In conclusion, the current scientific evidence does not support the hypothesis that running volume, by itself, increases the risk of knee osteoarthritis in adults. The practice proves to be safe and potentially protective against functional disability, even in individuals with a previous diagnosis of the pathology. Knee health in runners appears to be governed primarily by factors such as the management of traumatic injuries, body weight control, and the gradual progression of loads.

It is recommended that health professionals base their clinical guidelines on the individualization of the runner's profile, discouraging unfounded volume restrictions and encouraging running as a strategy for maintaining musculoskeletal and functional health.

REFERENCES

- Dhillon, J., et al. (2023). Effects of running on the development of knee osteoarthritis: An updated systematic review at short-term follow-up. *Orthopaedic Journal of Sports Medicine*, 11(3), 23259671231152900. <https://doi.org/10.1177/23259671231152900>
- Burfield, M., et al. (2023). The association between running volume and knee osteoarthritis prevalence: A systematic review and meta-analysis. *Physical Therapy in Sport*, 61, 1–10. <https://doi.org/10.1016/j.ptsp.2023.02.003>
- Hartwell, M. J., et al. (2024). Does running increase the risk of hip and knee arthritis? A survey of 3804 marathon runners. *Sports Health*, 16(4), 622–629. <https://doi.org/10.1177/19417381231190876>
- Coburn, S. L., et al. (2023). Is running good or bad for your knees? A systematic review and meta-analysis of cartilage morphology and composition changes in the tibiofemoral and patellofemoral joints. *Osteoarthritis and Cartilage*, 31(2), 144–157. <https://doi.org/10.1016/j.joca.2022.09.013>
- Lo, G. H., et al. (2017). Is there an association between a history of running and symptomatic knee osteoarthritis? A cross-sectional study from the Osteoarthritis Initiative. *Arthritis Care & Research*, 69(2), 183–191. <https://doi.org/10.1002/acr.22939>



Lo, G. H., et al. (2018). Running does not increase symptoms or structural progression in people with knee osteoarthritis: Data from the Osteoarthritis Initiative. *Clinical Rheumatology*, 37(9), 2497–2504. <https://doi.org/10.1007/s10067-018-4121-3>