

# Osteoarthritis and Cartilage



## Editorial

### Why past research successes do not translate to clinical reality: gaps in evidence on exercise program efficacy



**Keywords:**  
Osteoarthritis  
Exercise  
Reporting standardization

A vast body of evidence suggests that exercise is good for health in general. Furthermore, for those diagnosed with knee osteoarthritis (OA) it offers meaningful improvements in pain, function and leads to reduction in disability<sup>1</sup>. Many studies have shown a substantial benefit of exercise programs for persons with knee OA. In fact, a simple search on Pubmed using terms osteoarthritis and exercise identified more than 1000 entries on the topic. The evidence is so convincing that treatment guidelines from American College of Rheumatology, European League against Rheumatism, and Osteoarthritis Society International all recommend exercise as an effective OA regimen<sup>2–4</sup>. Furthermore, numerous literature syntheses and ultimately a Cochrane review indicated that further research is unlikely to provide new insights into effectiveness of exercise in those with knee osteoarthritis.<sup>1,5</sup>

In fact, exercise is among the most efficacious regimens among non-surgical treatments for osteoarthritis as its efficacy is similar to and, as evident from the literature, often surpasses the efficacy of acetaminophen, NSAIDs and opioids in terms of pain relief<sup>6–10</sup>. Additionally, as exercise is less toxic and has further benefits for chronic disease prevention – it should be clear then, that every OA patient should be exercising and therefore experiencing less pain, greater vitality, and overall greater quality of life. This is the theory. And what about real clinical practice?

The data from observational studies and national surveys show that only a small proportion, less than 10%, of persons affected by knee osteoarthritis are engaged in regular exercise<sup>11</sup>. This raises a question: why at times when there is a paucity of effective non-surgical treatments for knee OA is one of the most effective regimens often being neglected and/or underutilized? Perhaps, there is a gap between the data requirements in reporting evidence of efficacy and the data required for successful implementation of a regimen proven to be effective. Every pharmacologic regimen has a very clear set of instruction of dosing, frequency and the best way to take the medicine to optimize the efficacy. In contrast, for exercise programs there is no 'leaflet' enclosed with the 'package' that tells physician and informs a patient on when and how often, what procedures, what materials, where, who provides, what

modifications are needed and under what conditions will maximize the benefit and minimize the risk of adverse effects.

In this volume of the Journal, Bartholdy *et al.* points to a few reasons why implementation of exercise programs has proven to be challenging. The authors emphasize that deficiency in standardization and completeness of reporting is a major contributor to such challenges. In fact, reporting heterogeneity received a lot of attention and resulted in several consensus groups developing guidelines for reporting standardization and completeness in clinical studies. The most often cited and used CONSORT statement that has been designed for standardization of reporting of pharmacologic treatments had been augmented by similar recommendations for studies including non-pharmacologic regimens – TIDieR and Standard Protocol Items: Recommendations for Interventional Trials (SPIRIT)<sup>12,13</sup>. Finally, a Consensus on Exercise Reporting Template (CERT) has been published recently<sup>14</sup>. While many journals now require papers reporting results from RCTs to follow CONSORT checklist<sup>15</sup>, less attention is given to compliance with TIDieR, SPIRIT and/or CERT recommendations. As a result, Bartholdy *et al.* pointed to some disturbing findings: no intervention was completely described according to published recommendations; there was a negative trend between completeness of reporting and the magnitude of the efficacy of exercise programs for pain reduction in knee OA.<sup>16</sup>

Bartholdy and colleagues conducted a comprehensive analytic review, standardizing effect sizes across multiple studies, carefully examining reporting completeness and study quality according to established published criteria. Results of this wide-ranging analysis pointed to sub-par quality of reporting of exercise trials—sufficient description of the exercise dose and delivery mode had been missing in more than 80% of reported interventions.

The findings of Bartholdy and colleagues highlight the difference between the knowledge emanating from published literature and practice. The knowledge of efficacy does not directly translate into implementation. For implementation of exercise programs to be successful, a complete description of the programs emphasizing what, who, where, how and how often should be clearly depicted. In the absence of such complete description, the recommendations physicians often, or not that often, provide – 'have you tried to exercise?' or 'you may benefit from losing weight'—do not appear to be effective as these recommendations do not have a concrete prescription on all points raised by CERT.

How we can ensure that past research successes would translate into benefits observed in clinical practice? Perhaps, as Cochrane Group suggests, we don't need to spend more time and effort on

designing and conducting mechanistic studies to establish the efficacy of exercise programs; instead we should focus on pragmatic trials that are urgently needed, which must be well-designed and carefully described according to CERT recommendations. Furthermore, the relatively new field of implementation science may provide valuable tools to facilitate work that would ensure wide use of exercise programs in clinical practice. Reach, Effectiveness, Adoption, Implementation and Maintenance (RE-AIM) framework is a reliable tool for the translation of research to practice and should be used in studies focused on bringing exercise programs in day-to-day clinical management of knee OA<sup>17</sup>. In addition, journal editors and reviewers could further emphasize the importance of reporting completeness in studies focused on exercise, physical activity and other non-pharmacologic interventions. While it may add more pressures on authors, reviewers, and editorial staff, the benefit for the community of clinicians and, more importantly, patients may well be worth this additional effort. For such effort to be successful, we need to train and educate researchers on good practices of reporting clinical trials focused on non-pharmacologic regimens. Such training may be a part of journal websites, instructions for authors, and advertising campaigns. The effort to 'raise the bar' for reporting of exercise studies will require support from publishing industry, academia, and consistent mentoring effort. With TIDieR<sup>12</sup>, SPIRIT<sup>13</sup>, and CERT check lists in place – it may be a short run for a long gain! That gain will be appreciated by many persons with knee OA who would be better equipped to uptake exercise that will lead to a measurable improvement in functional status, pain reduction, and likely reduce or delay the need for opioids and surgeries.

### Funding

Support: NIH/NIAMS R01AR064320, K24AR057827, P30AR072577.

### Conflict of interest

Dr. Losina is a Deputy Editor to JBJS. She receives research funding through her institution from Genentech and Samumed.

### Acknowledgment

The author thanks Elizabeth E. Stanley, BSE, for editorial assistance.

### References

- Fransen M, McConnell S, Harmer AR, Van der Esch M, Simic M, Bennell KL. Exercise for osteoarthritis of the knee. *Cochrane Database Syst Rev* 2015;49(24):1554–7.
- Hochberg MC, Altman RD, April KT, Benkhalti M, Guyatt G, McGowan J, *et al.* American College of Rheumatology 2012 recommendations for the use of nonpharmacologic and pharmacologic therapies in osteoarthritis of the hand, hip, and knee. *Arthritis Care Res (Hoboken)* 2012;64:465–74.
- Fernandes L, Hagen KB, Bijlsma JWJ, Andreassen O, Christensen P, Conaghan PG, *et al.* EULAR recommendations for the non-pharmacological core management of hip and knee osteoarthritis. *Ann Rheum Dis* 2013;72(7):1125–35.
- McAlindon TE, Bannuru RR, Sullivan MC, Arden NK, Berenbaum F, Bierma-Zeinstra SM, *et al.* OARSI guidelines for the non-surgical management of knee osteoarthritis. *Osteoarthritis Cartilage* 2014;22:363–88.
- Uthman OA, van der Windt DA, Jordan JL, Dziedzic KS, Healey EL, Peat GM, *et al.* Exercise for lower limb osteoarthritis: systematic review incorporating trial sequential analysis and network meta-analysis. *Bmj* 2013;347:f5555.
- Zhang W, Moskowitz RW, Nuki G, Abramson S, Altman RD, Arden N, *et al.* OARSI recommendations for the management of hip and knee osteoarthritis, Part II: OARSI evidence-based, expert consensus guidelines. *Osteoarthritis Cartilage* 2008;16:137–62.
- Fransen M, McConnell S. Exercise for osteoarthritis of the knee. *Cochrane Database Syst Rev* 2008;Cd004376.
- Henriksen M, Hansen JB, Klokke L, Bliddal H, Christensen R. Comparable effects of exercise and analgesics for pain secondary to knee osteoarthritis: a meta-analysis of trials included in Cochrane systematic reviews. *J Comp Eff Res* 2016;5:417–31.
- Hernandez-Molina G, Reichenbach S, Zhang B, Lavalley M, Felson DT. Effect of therapeutic exercise for hip osteoarthritis pain: results of a meta-analysis. *Arthritis Rheum* 2008;59:1221–8.
- Smith SR, Deshpande BR, Collins JE, Katz JN, Losina E. Comparative pain reduction of oral non-steroidal anti-inflammatory drugs and opioids for knee osteoarthritis: systematic analytic review. *Osteoarthritis Cartilage* 2016;24:962–72.
- Liu SH, Waring ME, Eaton CB, Lapane KL. Association of objectively measured physical activity and metabolic syndrome among US adults with osteoarthritis. *Arthritis Care Res (Hoboken)* 2015;67:1371–8.
- Hoffmann TC, Glasziou PP, Boutron I, Milne R, Perera R, Moher D, *et al.* Better reporting of interventions: template for intervention description and replication (TIDieR) checklist and guide. *Gesundheitswesen* 2016;78:175–88.
- Moher D, Chan AW. SPIRIT (Standard Protocol Items: Recommendations for Interventional Trials). In: Moher D, Altman DG, Schulz KF, Simera I, Wager E, Eds. *Guidelines for Reporting Health Research: A User's Manual*. Oxford, UK: John Wiley & Sons, Ltd; 2014:56–67.
- Slade SC, Dionne CE, Underwood M, Buchbinder R, Beck B, Bennell K, *et al.* Consensus on exercise reporting template (CERT): modified delphi study. *Phys Ther* 2016;96:1514–24.
- Shamseer L, Hopewell S, Altman DG, Moher D, Schulz KF. Update on the endorsement of CONSORT by high impact factor journals: a survey of journal "Instructions to Authors" in 2014. *Trials* 2016;17:301.
- Bartholdy C, Warming S, Nielsen SM, Christensen R, Henriksen M. Replicability of recommended exercise interventions for knee osteoarthritis: a descriptive systematic review of current clinical guidelines and recommendations. *Osteoarthritis Cartilage* 2017;25:S409–10.
- Glasgow RE, Vogt TM, Boles SM. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *Am J Public Health* 1999;89:1322–7.

E. Losina†‡§\*

† Orthopaedic and Arthritis Center for Outcomes Research (OrACORE), Policy and Innovation eValuation in Orthopaedic Treatments (PIVOT) Center, Department of Orthopaedic Surgery, Brigham and Women's Hospital, Boston, MA, United States

‡ Harvard Medical School, Boston, MA, United States

§ Department of Biostatistics, Boston University School of Public Health, Boston, MA, United States

\* Address correspondence and reprint requests to: E. Losina, Orthopaedic and Arthritis Center for Outcomes Research (OrACORE), Policy and Innovation eValuation in Orthopaedic Treatments (PIVOT) Center, Department of Orthopaedic Surgery, Brigham and Women's Hospital, 75 Francis Street, BTM 5-016, Boston, MA, 02115, United States.  
E-mail address: [elosina@bwh.harvard.edu](mailto:elosina@bwh.harvard.edu).