Arthritis, osteoporosis, and low back pain

Evidence-based clinical risk assessment for physical activity and exercise clearance

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The prevalence and effects of chronic conditions of the musculoskeletal system (including arthritis, osteoporosis, and low back pain) are substantial; such conditions have strong negative effects on the lives of many Canadians, often leading them to seek medical advice. Over the next 10 years, arthritis is expected to affect between 21% and 26% of Canadians,[1] owing in part to the aging of the population and a growing prevalence of obesity. The prevalence of osteoporosis has been estimated conservatively to lie between 25% and 30% in women and 1% and 12% in men, with a substantial risk of associated bone fractures.[2,3] Chronic low back pain is reported by a further 21% of Canadians[4]—perhaps not surprisingly, as it is one of the most common health problems seen in primary care[5] and one of the leading causes of activilimitation and prolonged absence from work.[6]

The most common forms of arthritis, osteoarthritis and rheumatoid arthritis, are both associated with a self-limitation of physical activity (PA) owing to discomfort, pain, stiffness, or fatigue. Although there is no evidence that PA has a beneficial effect on the pathogenesis of either type of arthritis, systematic literature reviews provide strong evidence that symptoms can be reduced through PA, and that quality of life and overall physical fitness[7-11] can be improved. Improvements in fitness in turn decrease the risk of many other chronic diseases.[12,13]

Osteoporosis and osteopenia greatly increase the risk of fractures, especially in elderly women, whose risk of hip fracture matches their combined risk of developing uterine, ovarian, or breast cancer.[14] However, there is compelling evidence that bone mineral density increases, and the risk of falls and fractures decreases, with regular participation in PA.[15-18]

Back pain can be classified as acute (lasting between 2 days and 4 weeks), subacute (lasting 4 to 8 weeks), or chronic (lasting longer than 8 weeks). Clinical guidelines and systematic reviews indicate that PA reduces pain and improves function in patients with chronic back pain, but it is less effective in relieving acute pain.[19-21] Nevertheless, there is evidence that even for those with acute back pain, advice to stay active is more beneficial than forced bed rest; function is improved and work absences are reduced.[22,23]

This article summarizes applicable findings from a systematic literature review on physical activity in the management of arthritis, osteoporosis, and low back pain,[24] undertaken as one in a comprehensive series of articles examining the risks of PA in patients with various chronic diseases. This article discusses the assessment of risk for prescribing PA in patients with arthritis, osteoporosis, and low back pain, and introduces simple decision trees that facilitate clinical decision making and offer simple, practical recommendations for the prescription and supervision of PA in such patients, based on the specifics of their clinical diagnoses and risk categorization. The information contained in this article forms the foundation for the newly created Physical Activity Readiness Questionnaire (PAR-Q+)[25] and electronic Physical Activity Readiness Medical Examination (ePARmed-X+).[26]

Discussion

Extensive literature demonstrates that physical activity is a safe and effective adjunct to typical medical and pharmaceutical treatment of arthritis, osteoporosis, and low back pain.[24] Serious adverse events are rare when such patients exercise; event rates for arthritis (0.6%), osteoporosis (2.4%), and low back pain (0.06%) are sufficiently low that the risk-to-benefit ratio is strongly in favour of the prescription of PA.[24] However, it must be emphasized that the criteria for entry into most of the published studies excluded individuals with cardiovascular or cardiopulmonary disease, and prescription guidelines should be viewed in this context. Certain conditions predisposing this group of patients to adverse events during PA have now been identified and have been incorporated into the clinical decision trees presented here that aid practitioners in categorizing patients into high-, intermediate-, and low-risk categories, with corresponding differences in appropriate exercise prescriptions and requirements for supervision of PA. Conditions predisposing patients to increased risk are highlighted in these figures, and a summary of current recommendations for each of the 3 conditions is provided in the accompanying tables.

Arthritis. Patients with rheumatoid arthritis or osteoarthritis are at increased risk of cardiovascular disease, even if they do not currently have overt manifestations of such disease, and thus an evaluation of cardiovascular risk factors should be included in assessment of such patients. There is no evidence of any absolute contraindications to exercise in patients with arthritis; however, the literature

strongly supports the recommendations for risk classification and activity prescription outlined in **Table 1** and **Figure 1**.

Osteoporosis. Adverse events during PA are rare in patients with osteoporosis. By far most reported events are minor concerns such as muscle soreness and general pain. Current evidence warrants one absolute contraindication for patients with osteoporosis[27,28]: trunk flexion exercises should not be prescribed for patients at high risk of osteoporotic fracture. General recommendations are outlined in **Table 2** and **Figure 2**.*

Low back pain. The incidence of either minor or serious adverse events in patients with low back pain is low. Thus, we do not suggest any absolute contraindications to PA. However, as most research studies to date screened out patients with serious underlying conditions, the recommendations outlined in **Table 3** and **Figure 3*** should be restricted to patients without serious underlying conditions.

Conclusion

Current evidence suggests that PA participation has

*The clinical decision trees for osteoarthritis and low back pain (**Figures 2 and 3**) are available at **www.cfp.ca**. Go to the full text of this article online, then click on **CFPlus** in the menu at the top right-hand side of the page.

Table 1. Level and grade of evidence for physical activity recommendations for patients with arthritis

RECOMMENDATION	LEVEL*	GRADE†
Patients with advanced forms of disease‡ or radiologic evidence of severe joint damage should participate in non–weight-bearing activities to maintain or improve mobility, strength, and cardiovascular function. These patients should not participate in very-high-intensity exercises such as those involving jumping or high-load-bearing activities	II	A
Those individuals with recently diagnosed arthritic disease or those experiencing acute flare-up of their disease should be prescribed physical activity that limits exacerbations of disease activity, such as light to moderate pool-based exercise§ or light cycle ergometer activity	III	B
Patients with stable, well-controlled disease and no progressive joint damage may participate in a variety of physical activities including weight-bearing and non–weight-bearing activities to maintain or improve mobility, strength, and cardiovascular function	II	A

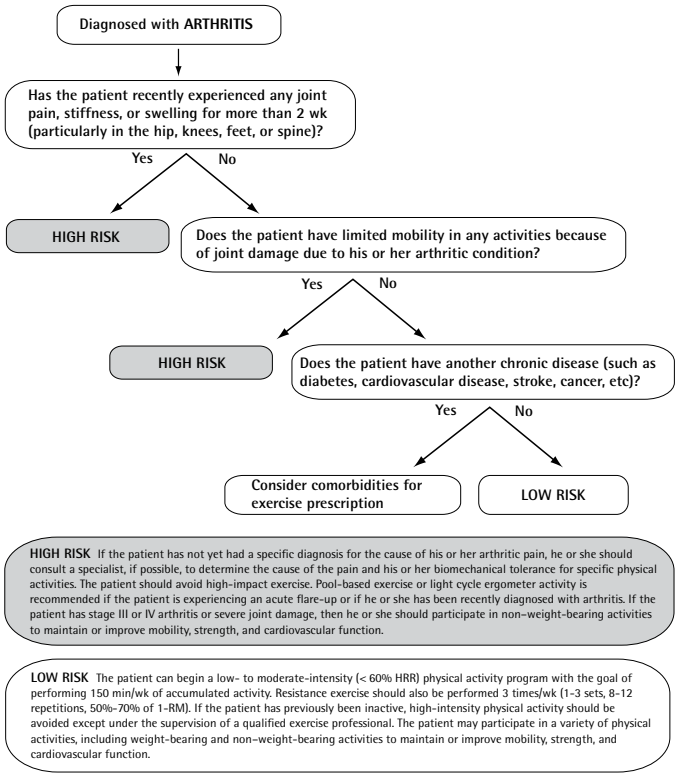
*Level I evidence includes randomized controlled trials; level II evidence includes randomized controlled trials with important limitations or observational trials with overwhelming evidence; level III evidence includes observational trials; and level IV evidence includes anecdotal evidence or expert opinion.
†Grade A recommendations are strong; grade B recommendations are intermediate; and grade C recommendations are weak.
‡Stage III or IV arthritis.
§Water aerobics.

Table 2. Level and grade of evidence for physical activity recommendations for patients with osteoporosis

RECOMMENDATION	LEVEL*	GRADE†
Patients with osteoporosis at high risk of fracture‡ should not perform trunk flexion exercises, as these increase the risk of spine fracture. Trunk extension exercises and abdominal stabilization exercises can be done safely	II	A
Patients recovering from hip fracture should not perform physical therapy exercises for more than 15-30 min per session early in the rehabilitation process, as longer sessions increase the risk of orthopedic complications. Weight-bearing exercise can be started after 18 d, and higher-intensity exercises such as resistance training can be progressively implemented 1 mo after inpatient rehabilitation	II	A
Patients with osteoporosis can safely perform a variety of aerobic physical activities or resistance training. Intensity of the exercise sessions should initially be light to moderate and progressively increase based on the individual's capability	II	A
Individuals with osteoporosis should avoid powerful twisting movements of the trunk	III	C
Individuals with spinal cord injury and osteoporosis of the lower limbs should avoid maximum-intensity physical activity (eg, maximal strength testing) via electrical stimulation of the lower limbs	III	C
Progressive lower-limb resistance training, cycling, and walking (all assisted by electrical stimulation) or body weight–supported treadmill training are safe forms of physical activity for individuals with spinal cord injury who do not have recent fragility fractures	II	A

*Level I evidence includes randomized controlled trials; level II evidence includes randomized controlled trials with important limitations or observational trials with overwhelming evidence; level III evidence includes observational trials; and level IV evidence includes anecdotal evidence or expert opinion.
†Grade A recommendations are strong; grade B recommendations are intermediate; and grade C recommendations are weak.
‡Those with previous fragility fractures or those taking systemic corticosteroids for a cumulative period of 3 mo or longer during the preceding year at a prednisone equivalent dose of ≥ 7.5 mg/d.

Figure 1. Clinical decision tree for assessing the risk of adverse events during physical activity in patients with arthritis: *This decision tree can be used to categorize patients' level of risk, and the requirements of physical activity prescription and monitoring can be determined accordingly.*



1-RM—1-repetition maximum, HRR—heart rate reserve.

a favourable risk-to-benefit ratio for most patients with arthritis, osteoporosis, or low back pain. The risk of adverse events is somewhat higher in certain categories of patients, and specific recommendations for PA and its supervision should be based on decision trees incorporating individualized risk classification.

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Competing interests
None declared

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Table 3. Level and grade of evidence for physical activity recommendations for patients with low back pain

RECOMMENDATION	LEVEL*	GRADE†
Those with nonspecific chronic low back pain, without serious underlying conditions,‡ can safely perform a variety of exercises that are progressive in nature. However, they should initially avoid high-impact physical activity, heavy resistance training, or extreme trunk flexion, extension, or rotation in a direction that induces pain	II	B
Those with acute (duration between 2 d and 4 wk) low back pain, without serious underlying conditions,‡ can safely perform direction-preference–based physical activities.§ These include low back extension and flexion exercises or a combination of these movements. Pain relief and functional ability is enhanced if these are combined with heat-wrap treatment	II	B
Those with subacute low back pain, without serious underlying conditions,‡ can safely perform physical activity consisting of walking, cycling, stretching, and trunk and limb strengthening, including progressive strength and postural training of the back and abdominal muscles	II	B
Those with spondylolisthesis or spondylolysis can safely perform progressive strength and postural training of the back and abdominal muscles. (Athletes should cease strenuous sport participation for at least 3 mo)	II (III)	A (A)
Those who had surgery for disk herniation more than 1 y ago can safely perform isometric abdominal and back exercise and progressive physical activity involving aquatic exercises and dynamic back or hip extension and abdominal exercises	II	B

*Level I evidence includes randomized controlled trials; level II evidence includes randomized controlled trials with important limitations or observational trials with overwhelming evidence; level III evidence includes observational trials; and level IV evidence includes anecdotal evidence or expert opinion.
†Grade A recommendations are strong; grade B recommendations are intermediate; and grade C recommendations are weak.
‡Previous back surgery, spondylolysis, spondylolisthesis, neurologic symptoms, inflammatory and infectious conditions, or spinal fractures.
§Movement in the direction that does not induce pain.

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