Best Practice & Research Clinical Rheumatology 29 (2015) 120–130

Contents lists available at ScienceDirect

Best Practice & Research Clinical Rheumatology

journal homepage: www.elsevierhealth.com/berh

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Physical exercise as non-pharmacological treatment of chronic pain: Why and when

Kirsten R. Ambrose [a, *], Yvonne M. Golightly [a, b, c]

[a] Thurston Arthritis Research Center, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA
[b] Department of Epidemiology, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA
[c] Injury Prevention Research Center, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA

Keywords:
Chronic widespread pain
Fibromyalgia
Arthritis
Non-pharmacological treatment
Chronic pain
Exercise
Strength
Aerobic

A B S T R A C T

Chronic pain broadly encompasses both objectively defined conditions and idiopathic conditions that lack physical findings. Despite variance in origin or pathogenesis, these conditions are similarly characterized by chronic pain, poor physical function, mobility limitations, depression, anxiety, and sleep disturbance, and they are treated alone or in combination by pharmacologic and non-pharmacologic approaches, such as physical activity (aerobic conditioning, muscle strengthening, flexibility training, and movement therapies). Physical activity improves general health, disease risk, and progression of chronic illnesses such as cardiovascular disease, type 2 diabetes, and obesity. When applied to chronic pain conditions within appropriate parameters (frequency, duration, and intensity), physical activity significantly improves pain and related symptoms. For chronic pain, strict guidelines for physical activity are lacking, but frequent movement is preferable to sedentary behavior. This gives considerable freedom in prescribing physical activity treatments, which are most successful when tailored individually, progressed slowly, and account for physical limitations, psychosocial needs, and available resources.

* Corresponding author. Thurston Arthritis Research Center, The University of North Carolina at Chapel Hill, 3300 Thurston Bldg., CB# 7280, Chapel Hill, NC 27599-7280, USA. Tel.: +1 919 966 7209; fax: +1 919 966 1739.
E-mail address: kirsten_ambrose@med.unc.edu (K.R. Ambrose).

http://dx.doi.org/10.1016/j.berh.2015.04.022
1521-6942/

Introduction

Chronic pain conditions can be identified as having an (1) objective pathogenic, genetic, or biologic origin that explains symptom presentation, or (2) idiopathic source with unknown origin for the illness. The former includes arthritis (osteoarthritis (OA) and rheumatoid arthritis (RA)), systemic inflammatory rheumatic diseases, connective tissue diseases, post-herpetic neuralgia, and peripheral neuropathy, which are typically diagnosed via objective biologic or inflammatory markers, radiologic evidence or other identifiable tissue damages. Idiopathic conditions, which often rely on subjective patient report, include complex regional pain syndrome (CRPS), fibromyalgia (FM), chronic widespread pain (CWP), subsets of chronic low back pain (CLBP), and chronic pelvic pain (CPP). These syndromes are defined by unremitting pain, and they may include secondary issues of fatigue, sleep disturbance, cognitive deficits, and depression [1]. For this chapter, we will largely focus on arthritis and FM as prototypical chronic pain conditions of known and unknown origin, respectively. Both are incurable, challenging to treat, tend to have poor long-term prognosis, and impose substantial economic burden on health-care systems and society.

Chronic pain is a significant public health concern that differentially burdens vulnerable populations, such as the elderly, children, and ethnic/racial minorities, due to disparities in treatment and resources [2]. Recent estimates suggest that chronic pain affects 100 million people in the United States (US) and 1.5 billion people worldwide, figures that are steadily rising [3,4]. In 2010, the estimated annual costs related to chronic pain were $560–635 billion in combined medical costs, lost earnings, disability, and lost productivity [4]. Arthritis, specifically, is the leading cause of disability in the US. Combined medical costs and lost earnings exceed $189 billion annually [5]. Arthritis is highly prevalent, affecting at least 22% of adults and nearly half of adults >65. Furthermore, 43.2% of those with arthritis have an arthritis-attributable activity limitation [6], and 24–58% of adults with arthritis are physically inactive [7–13]; estimates may be low because they are primarily based on self-report measures.

Physical inactivity is an added insult to chronic pain conditions; in fact, it may contribute to the rise in chronic diseases. World Health Organization and the Centers for Disease Control and Prevention (CDC) target insufficient physical activity as a leading risk factor for noncommunicable diseases and death worldwide [14,15]. Physical inactivity or sedentary behavior is ubiquitous at all ages, rendering many chronic diseases once relegated to older populations increasingly common in younger age groups [16,17]. Sedentary behavior is detrimental to health, physical function, and health-related quality of life [18–21]. In a nationally representative study of 2286 adults who were 60+ years old, each additional daily hour of sedentary behavior resulted in a 46% greater odds of disability with activities of daily living, controlling for moderate–vigorous physical activity, socioeconomic factors, and health conditions [18]. Results from this study and other studies of sedentary behavior [19–21] suggest that even bursts of moderate–vigorous physical activity may not negate the harms of long, continuous hours of sedentary behavior. Regular physical activity emerges as a significant tool for both primary and secondary prevention of chronic disease with the ability to mitigate symptoms and to slow or stall disease progression [15,16].

Usual treatments for chronic pain conditions: poor to modest efficacy

Evidence for the effect of exercise on disease pathogenesis for chronic pain is lacking, with current evidence largely focusing on symptomatology. With no cure for many chronic pain conditions, treatments address symptoms such as pain, reduced functional capacity, poor sleep, fatigue, joint immobility, cognitive dysfunction, depression, and anxiety. Efficacy for pharmacologic treatment varies widely among chronic pain conditions often dictated by etiology or idiopathy. For example, methotrexate significantly improves pain, swelling, and disease progression in RA and other systemic inflammatory rheumatic disease [22]. For idiopathic chronic pain and FM, pharmacologic treatments often include non-steroidal anti-inflammatory drugs (NSAIDs), topical agents such as capsaicin, antidepressants (selective serotonin reuptake inhibitors, serotonin–norepinephrine reuptake inhibitors (SNRIs), and tricyclics), and anticonvulsants prescribed in doses known to improve pain [23,24]. Opioids are also prescribed; however, they are generally unsatisfactory for chronic pain with little pain