Autoimmunity Reviews 11 (2012) 219–225

Contents lists available at ScienceDirect

Autoimmunity Reviews

journal homepage: www.elsevier.com/locate/autrev

Review

Autoimmune diseases and rehabilitation

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ARTICLE INFO

Available online 18 May 2011

Keywords:
Rehabilitation
Autoimmune diseases
Rheumatoid arthritis
Multiple sclerosis

ABSTRACT

This review gives an overview of the rehabilitation of autoimmune diseases. After general remarks on rehabilitation, the effects of acute and chronic exercises on inflammatory markers are summarized. Most of the available literature deals with rheumatoid arthritis (RA) and multiple sclerosis (MS), and therefore, rehabilitation of these diseases is described in more detail. Exercise is the main component in the rehabilitation of patients with RA and aims at increasing physical capacity, muscle strength, aerobic endurance, cardiovascular fitness and functional abilities, and helps to prevent secondary deconditioning due to reduced activity levels. Since MS causes a wide range of symptoms, the rehabilitation of these patients requires a multidisciplinary approach and encompasses physiotherapy, exercise therapy, hippotherapy, cognitive rehabilitation, psychological therapy, strategies to improve fatigue and coping programs. The ultimate goal of rehabilitation is to enable patients with chronic conditions to reach and maintain their optimal physical, sensory, intellectual, psychological and social functional levels, and to attain independence and self-determination as far as possible.

Contents

1. Introduction

"Rehabilitation of people with disabilities is a process aimed at enabling them to reach and maintain their optimal physical, sensory, intellectual, psychological and social functional levels. Rehabilitation provides disabled people with the tools they need to attain independence and self-determination."

This definition provided by the World Health Organization (www.who.int) describes the aims of rehabilitation independent from the underlying disease. With other words, rehabilitation is an active process of education and enablement that is focused on the proper management of disability and on the minimisation of handicap, with the goal of achieving full recovery or, if a full recovery is not possible, the goals become focused on achieving the optimal physical, mental and social potentials of the patients so that they can remain or become integrated into their most appropriate environment [1]. Rehabilitation may thus improve independence and quality of life by maximizing ability and participation. In accordance with this, German social laws have

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doi:10.1016/j.autrev.2011.05.016

strengthened the role of rehabilitation when stating in 2007 that rehabilitation is a mandatory service rather than at the discretion of the payer and has thus to be covered by the health insurances, with participation in social life being the ultimate goal of all rehabilitation efforts rather than functional improvement alone [2].

The essential components of successful rehabilitation include expert multidisciplinary assessment, goal-oriented programs and evaluation of impact on patient and goal achievement through the use of clinically appropriate and scientifically sound outcome measures that incorporate the patient's perspective [3]. While these principles seem intuitively sound, the evidence-base underpinning multidisciplinary assessment and goal-oriented programs is generally weak and mainly based on expert opinions [3]. Similarly, the benefits of rehabilitation have not been unequivocally demonstrated, although the clinical experience point towards efficacy in the individual patient. Controlled studies are rare due to difficulties in trial design since there is justifiable reluctance on ethical grounds to withhold the best therapy from patients. Research activities are further compromised as treatment blinding is never possible apart from evaluator blinding, and by the large range of outcome measures that are used. Moreover, the philosophy behind rehabilitation and evidence-based medicine is often in conflict with each other since the reductionism necessary for clinical trials is often insensitive to the individually, tailored aims of rehabilitation medicine [1]. In a comprehensive review of the exercise interventions literature on persons with physical and cognitive disabilities, 80 different physical activity/exercise interventions were identified involving aerobic (26%), strength (25%), and combined aerobic and strength (23%) exercises. Only 32 interventions were tested in randomized controlled trials. Nearly half the studies targeted stroke (20%), multiple sclerosis (MS) (15%), and intellectual disability (13%), with significantly fewer studies dealing with other diseases [4]. With this broad scope of the literature, generalizability is limited, and a new body of evidence is needed with stronger research designs. Moreover, in comprehensive rehabilitation programs, the demonstrated effects can only with difficulties be attributed to a specific component of the program, and thus, the overall performance of the programs, and not the individual components need to be evaluated [5].

2. Effects of acute and chronic exercise on inflammatory markers

In healthy individuals, acute exercise has an effect on the immune system [6]. Pro- and anti-inflammatory cytokines TNF-α, IL-1, IL-1ra, IL-6 and IL-10 as well as leukocyte subsets such as neutrophils, lymphocytes including T, B, NK cells and monocytes and plasma concentrations of CRP can increase to various magnitudes, with the most prominent changes seen after strenuous and eccentric exercise. Extreme exercise such as marathon runs have been associated with a depression of immune function which may increase the athlete's susceptibility to infection; the risk of acute infection raised to 12.9% in the week after the Los Angeles marathon compared to 2.2% of similar experienced non-competitors [7]. In contrast to acute (normal) exercise, participation in regular exercise such as endurance training can reduce resting levels of many inflammatory markers [8]. Thus, the effects of exercise on immune function in healthy individuals are complex and dependent on the intensity, duration and type of exercise, and inflammatory markers are differently affected in acute vs. chronic exercise.

The attenuation of regular (chronic) exercise on basal levels of inflammatory markers has been used to recommend exercise as an anti-inflammatory therapy in chronic inflammatory diseases including autoimmune disorders. In a comprehensive review on the effects of acute and chronic exercises, 19 studies of chronic inflammatory conditions including MS, diabetes mellitus and rheumatoid arthritis were identified that evaluated inflammatory markers [9]. Although the results indicated that both, acute and chronic exercises might elicit different inflammatory responses compared to healthy controls, i.e. exaggerated after acute exercise and attenuated after chronic exercise, they also revealed a major gap of knowledge in basic research. Differences in training programs, heterogeneity of the population studied, and analytic methods in conjunction with the paucity of studies all may contribute to the inconsistent results. Moreover, training levels may also affect the responses of exercise on inflammatory markers. Although serum levels of IFN-γ, IL-10 and TNF-α raised similarly in MS patients and healthy controls after an eight-week aerobic training program, cytokine levels were less inducible in untrained MS patients compared to trained patients and healthy individuals [10]. The impact of these findings on rehabilitation of inflammatory diseases is not clear, and more research is needed before exercise recommendations for patients with autoimmune disease can be made in an attempt to ameliorate the underlying inflammatory process.

3. Autoimmune diseases

A number of autoimmune diseases may cause chronic disabilities and are thus suitable for rehabilitation. A MEDLINE search with the keywords “rehabilitation”, “autoimmune diseases” and “review” revealed the following conditions, ranked with increasing frequencies: multiple sclerosis (MS), rheumatoid arthritis, diabetes mellitus, Guillain–Barré syndrome, ankylosing spondylitis, systemic Lupus erythematosus, Sjögren's syndrome, chronic inflammatory demyelinating polyradiculoneuropathy, myositis, and myasthenia gravis. The most relevant publications concerned rheumatoid arthritis and the impact of neurorehabilitation; the most common autoimmune disease undergoing neurorehabilitation is MS. Therefore, this review focuses – after a brief summary of rehabilitation in rheumatic diseases – on MS including recent findings from the literature and own experiences. In addition, general principles as well as management of individual symptoms are outlined exemplary for the rehabilitation of patients with MS.

3.1. Rheumatic diseases

Multidisciplinary, comprehensive rehabilitation programs involving many healthcare professionals are widely available for patients with rheumatic diseases. International guidelines on rheumatoid arthritis and ankylosing spondylitis recommend non-pharmacological interventions as adjunctive interventions to medications [11]. However, the evidence-base is sparse, particularly for ankylosing spondylitis, systemic lupus erythematosus and Sjögren's syndrome, with most of the published studies dealing with rheumatoid arthritis. These support the use of exercise and educational interventions with a cognitive behavioral component, while the evidence on other, widely used components (electrophysical modalities, balneotherapy, dietary interventions as well as alternative and complementary interventions) is generally weak or inconclusive [11,12]. Assistive technology has rarely been a subject for randomized controlled trials: a Cochrane review identified only one study with 29 participants addressing the effects of an eye drop device compared to a standard bottle in patients with rheumatoid arthritis suffering from persistent dry eyes [13]. Physical exercise of moderate to high intensity has also been found to be effective in patients with both, lupus erythematosus with mild to moderate disease and primary Sjögren's syndrome; patients may benefit in terms of increasing their aerobic capacity and physical function and ameliorating depression and fatigue, a dominating and disabling symptom in rheumatic diseases [14].

Non-pharmacological treatment modalities are often used as an adjunct to drug therapy in rheumatoid arthritis. Apart from educational interventions, exercise is the main component in the rehabilitation of these patients and aims at increasing physical capacity, muscle strength, aerobic endurance, cardiovascular fitness and functional abilities, and helps to prevent secondary deconditioning due to reduced activity