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Physiotherapy in Parkinson's disease patients: Recommendations for clinical practice

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ABSTRACT

Parkinson's disease is the second most common neurodegenerative disorder after Alzheimer's disease with a prevalence of 0.3% of the whole population in industrialized countries. Currently only symptomatic treatment options comprising pharmacological and surgical therapies as well as adjunct rehabilitative interventions are available. Increasing evidence from a wide range of clinical and experimental studies suggests that regular exercise and physical fitness favourably influence progression of symptoms. Physical therapy plays an important role in the management of Parkinson's disease providing strategies to improve physical capacity and to overcome pharmaco-resistant motor symptoms such as complex disturbances of gait, balance, and posture at different stages of the disease. Although physical therapy provides clinically meaningful benefits for Parkinson's disease patients, referral rates are often suboptimal for several reasons. Regional differences in availability of experienced therapists and specific training programmes affect administration of physical therapy together with health economic regulations und limitations.

Physicians thus need to cooperate with regional allied health professionals to implement strategies and treatment programmes that are tailored to meet the capabilities, deficits, and personal preferences of individual PD patients. Evidence from numerous studies suggests that these efforts are worthwhile.

Idiopathic Parkinson's disease (PD) is a progressive neurodegenerative disorder which over the course of the disease often results in an incapacitating burden of long-term complications including complex gait dysfunction, postural instability and consequent falls, speech and swallowing disturbances as well as cognitive decline. These deficits are notoriously difficult to treat and almost no significant improvement is achieved through modern pharmacological or surgical therapy. Thus, PD patients have to cope with increasing physical impairment and participation restrictions which severely threaten quality of life [1,2] and lead to a significant economic burden to both patients and society [3,4].

Effects of exercise on PD progression

Increasing evidence suggests that sustained vigorous exercise and physical fitness may favourably influence PD progression [5]. Regular exercise per se displays a multitude of beneficial effects, including an improvement of cardiovascular and cerebrovascular health, prevention of osteoporosis, reduction of fracture risk and age-related sarcopenia, as well as psychosocial activation and may

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possibly even initiate a general anti-inflammatory effect [6]. In addition to these general effects on age-related health issues, accumulating evidence, albeit indirect, indicates that ongoing exercise may also exert neuroprotective effects in PD. Prospective studies focussing on the relationship between physical activity and the future risk of PD demonstrate a significant risk reduction with moderate to vigorous physical activity levels during midlife [7–9]. It can be countered that an aversion to exercise and reduced activity may reflect preclinical PD manifestation; however, if exercise reduces PD risk it may also attenuate disease progression. This argument is biologically plausible and perhaps even likely, although there is only little direct evidence from clinical trials. Cardiovascular fitness correlates with better cognitive and motor scores in PD patients [10,11]. In addition, regular exercise improves corticomotor excitability as a measure of neuroplasticity in PD patients [12] and reduces mortality [13]. Furthermore, exercise and physical fitness also reduce risks of cognitive impairment in the general population. Direct clinical evidence, though sparse is supported by experimental findings from different animal models indicating that physical exercise mitigates the effects of dopaminergic toxins [14], and elevates certain neurotrophins [15] which, in turn, leads to a number of neuroprotective effects [16]. This overall body of evidence is compelling and suggests that regular physical activity and exercise should play a central role in the treatment of PD [5]. Physicians should encourage their PD patients to engage in regular exercise to establish or maintain physical fitness. The type of exercise may vary and reflect not only the patient's capabilities but also their individual interests in order to encourage implementation in daily routine. Moreover, deconditioned patients may be in need of further support. Establishment or maintenance of physical fitness should be the main goal in these patients. This goal can be achieved with the help of physical therapists using structured physical training programmes.

Physiotherapy in PD

During the course of the disease, PD patients experience deterioration of body function and develop – even under optimal pharmacological and/or surgical therapy – complex gait disorders. These include freezing, festination, hesitation during starting or turning, postural instability and falls, and – in some cases – postural deformities such as camptocormia or Pisa syndrome often with multifactorial pathophysiology [17]. To overcome theses dopa-resistant motor disturbances, most patients require additional physical therapy. Physiotherapy for PD comprises a wide range of approaches focussing on transfers, posture, upper limb function, balance and gait in addition to using cueing strategies, cognitive movement strategies and exercise to maintain and improve quality of life. Recent meta-analyses and Cochrane reviews demonstrate that physiotherapy was beneficial in a wide range of functional outcomes over a short-term period of less than three months [18,19]. The evidence-based medicine review of the Movement Disorder Society on treatment of motor PD symptoms also concluded that physical therapy is possibly useful as symptomatic adjunct therapy [20]. There were few differences in treatment effect amongst the wide range of different physiotherapy techniques used. Quantitatively, the differences are ofteninsignificant, however the improvements seen with regard to speed, Berg balance scale, and UPDRS scores were at levels that suggest clinical relevance [18,19]. However, there is still a need to perform large well-designed randomized controlled trials to demonstrate long-term efficacy and cost-effectiveness of physiotherapy in PD. Trial design is difficult since multiple confounders (patient motivation, only single blinding, suitable control groups, etc.) are inherent in the intervention itself. On the positive side, the number of studies dealing with physiotherapeutic approaches in PD patients meeting high methodological quality is increasing.

Several studies investigating general physiotherapy in PD patients with at least Hoehn & Yahr stages II or III have indeed demonstrated that group physiotherapy using an assortment of general physiotherapeutic techniques [21,22], supervised stretching and treadmill training [23,24], and a home-based personalized exercise programme [25], exerts significant benefits. In addition to these general physiotherapeutic techniques, repetitive task-specific training of deficient functions has shown to significantly decrease functional impairment in PD patients. Those patients experiencing problems with balance and consequent falls benefit from a two week training programme of compensatory steps by means of a modified pull test manoeuver [26] which significantly improves postural responses and gait velocity. Patients with predominant bradykinesia profit from intensive training of high-amplitude movements (LSVT-BIG) – an approach using the same training principles such as the Lee Silverman voice therapy (LSVT-LOUD) for PD dysarthria [27]. Compared to Nordic walking or home training programmes without supervision, PD patients receiving LSVT-BIG treatment showed a significant improvement in UPDRS motor score (−5.05 points) and further assessments of gait and mobility [28]. PD patients with gait hesitation, freezing, and frequent falls are known to benefit from different cueing strategies or focussed attention. Experienced physiotherapists train patients to use sensory, auditory or visual cues to overcome freezing and 'start hesitation'. In this respect three recent studies [29–31] have demonstrated efficacy of different cueing strategies in PD patients with freezing of gait. However, improvement in outcome measures was small and, unfortunately did not persist for more than 6 weeks after completion of the study [29].

Beside these physiotherapeutic treatment strategies, training of formalized movement patterns as in Qigong [32] and Tai Chi [33] or even in community-based Tango dancing [34] have a proven efficacy towards improving motor scores in PD patients. Quantitatively, improvement in the UPDRS motor score was in the range of 5 points after Tai Chi and up to 12 points after 12 months of community-based Tango dancing. Physiotherapists should be encouraged to implement such methods in their training and treatment programmes and motivate PD patients to attend appropriate courses at local community centres.

Intrinsic and extrinsic factors influencing administration of physiotherapy in PD patients

Although physiotherapy provides clinically meaningful benefits for PD patients, at least in the short term, referral rates for physiotherapeutic therapy are usually suboptimal. Nijkrake and colleagues [35] analyzed referral of PD patients to allied health care and the professional expertise of therapists in a region in the Netherlands by means of sending questionnaires to both PD patients and allied health professionals. Data showed that 63% of PD patients received physical therapy, 6% occupational therapy, and 14% speech therapy. Referral rates and treatment duration in the Netherlands are relatively high. However, PD patients with problems that could potentially be alleviated by physiotherapy were often not being referred [35]. Furthermore, most patients were being treated by therapists who lacked PD-specific expertise. This study not only reveals a suboptimal and somewhat arbitrary referral practice but also shows that various allied health care professionals, in particular therapists involved in the treatment of PD patients, lack sufficient expertise for this group of patients [35,36].

In daily clinical practice, referral of PD patients to physiotherapy by physicians seems to be influenced by a number of factors (Fig. 1). These include availability and accessibility to physiotherapists with experience in applying PD-specific exercise pro-