**Review**

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# Psychosocial Aspects of Rehabilitation in Neurodegenerative Diseases and Fields of Approach

## *Nörodejeneratif Hastalıklarda Rehabilitasyonun Psikososyal Yönleri ve Yaklaşım Alanları*

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**ABSTRACT**

Psychosocial health is a concept included in definition of health by World Health Organization and corresponds to state of emotional and social well-being. In the context of neurological disorder, psychosocial health refers to social reintegration and psychological adjustment. Studies reporting that neurological diseases are associated with negative psychosocial health outcomes such as a decrease in the quality of life, a decrease in ability to establish and maintain social relationships, and an increase in high levels of depression, stress and anxiety have increased in recent years. Therefore, it is important to consider programs and interventions that can improve the psychosocial health of people with neurodegenerative diseases. Currently, it is not clear which psychosocial approaches can produce definitively positive results. The aim of this study is to examine how being an individual with Multiple Sclerosis and Parkinson's, which are the most common neurodegenerative diseases in the clinic, affects psychosocial health in the rehabilitation process and the existing evidence-based psychosocial approaches. For this purpose, a descriptive review was prepared by scanning English and Turkish articles with keywords on psychotherapeutic, psychosocial and mindfulness-based interventions and stress management, published in the determined databases in the last 10 years. Studies have shown that psychosocial approaches such as interventions for acquisition of social integration and adaptive coping strategies, cognitive and social behavioral therapy methods, concentration and movement-based mind-body exercises are effective in rehabilitation of neurodegenerative diseases. These approaches were reported to have benefits in reducing anxiety, depression and fatigue, improving sleep quality and quality of life, relationships, employment, level of participation, motivation and self-efficacy in exercise and physical activity, improving physical functions, facilitating difficult and personal experiences and adaptation to new life in rehabilitation processes and more evidence-based studies are needed.

**Keywords:** Multiple sclerosis, Parkinson's disease, psychosocial interventions, rehabilitation

**ÖZ**

Psikososyal sağlık, Dünya Sağlık Örgütü'nün sağlık tanımı içerisinde yer alan bir kavram olup duygusal ve sosyal açıdan iyi olma halini kapsamaktadır. Nörolojik bozukluk kapsamında psikososyal sağlık ise sosyal bütünleşme ve psikolojik uyumu ifade eder. Nörolojik hastalıkların yaşam kalitesinde, sosyal ilişkiler kurma ve sürdürme yeteneğinde azalma ve yüksek depresyon, stres ve kaygı düzeylerinde artış gibi olumsuz psikososyal sağlık sonuçları ile ilişkili olduğunu bildiren çalışmalar son yıllarda artış göstermektedir. Bu sebeple nörodejeneratif hastalığı olan kişilerin psikososyal sağlığını iyileştirebilecek müdahaleler üzerinde düşünmek önemlidir. Günümüzde hangi psikososyal yaklaşımların kesin olarak olumlu sonuçlar verebileceği açık değildir. Bu çalışmanın amacı klinikte en sık karşılaşılan nörodejeneratif hastalıklar olan Multiple Skleroz ve Parkinson'lu bir birey olmanın rehabilitasyon sürecinde psikososyal sağlığı ne yönde etkilediğini ve kanıta dayalı mevcut psikososyal yaklaşımları irdelemektir. Bu amaçla, belirlenen veri tabanlarında son 10 yılda yayınlanan psikoterapötik, psikososyal ve farkındalık temelli müdahaleler, stres yönetimi ile ilgili anahtar sözcükler ile İngilizce ve Türkçe makaleler makaleler taranarak tanımlayıcı bir derleme hazırlandı. Yapılan çalışmalarda sosyal bütünleşmenin ve uyumlu başa çıkma stratejilerinin kazanılmasına yönelik müdahaleler, bilişsel ve sosyal davranışçı terapi yöntemlerinin, konsantrasyon ve hareket temelli zihin beden egzersizlerinin uygulanması gibi psikososyal yaklaşımların nörodejeneratif hastalıkların rehabilitasyonunda etkili olduğu görülmüştür. Bu yaklaşımların anksiyete, depresyon ve yorgunluğu azaltmada, uyku kalitesi ve yaşam kalitesini, ilişkileri, istihdamı, egzersiz ve fiziksel aktiviteye katılım düzeyi, motivasyonu ve öz-yeterliliğini artırmada, fiziksel fonksiyonları iyileştirmede, yaşanan zor ve kişisel deneyimleri ve yeni yaşama adaptasyonu kolaylaştırmada faydaları olduğu ve daha fazla kanıta dayalı çalışmalara ihtiyaç olduğu bildirilmiştir.

**Anahtar sözcükler:** Multiple skleroz, Parkinson hastalığı, psikososyal müdahaleler, rehabilitasyon

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## Introduction

Psychosocial health is a concept within the definition of health of the World Health Organization (WHO) and includes emotional and social well-being. In the context of neurological disorder, psychosocial health refers to social and emotional well-being, social integration and psychological adjustment (McCarthy et al. 2010).

Since studies reporting that neurological diseases are associated with negative psychosocial health outcomes have increased in recent years, it is important to consider treatment programs and interventions that can improve the psychosocial health of individuals with neurodegenerative diseases (McCarthy et al. 2010). The negative impact of psychosocial health becomes evident in both community and rehabilitation settings. In a systematic review, it has been shown that various neurological conditions, including epilepsy, brain tumors, stroke, and head injuries, are especially associated with psychological impact and negative psychosocial health outcomes, and that these negative experiences lead to a decrease in QoL. Neurological disorders can negatively affect an individual's social health and ability to establish and maintain social relationships. In the field of emotional health, neurological disorders are associated with high levels of depression, stress and anxiety (Lakhani et al. 2018).

Currently, it is difficult to address the negative psychosocial health consequences of neurodegenerative diseases, and it is not clear which psychosocial approach interventions can provide positive results (Lakhani et al. 2018). The aim of this study is to examine the evidence-based psychosocial approaches available in the literature, as well as how the presence of the disease, living with the disease, and neurological symptoms and disorders affect psychosocial health in the rehabilitation process in Multiple Sclerosis (MS) and Parkinson's diseases (PD), which are the most common neurodegenerative diseases in the clinic.

## Method

The design of this study is a descriptive review prepared as a result of literature research. To this end, PubMed, Web of Science, Scopus, Cochrane, and PEDro were used to search for articles on psychotherapeutic, psychosocial, and mindfulness-based interventions and stress management published over the past 10 years. In addition, previous articles related to the results of the studies reached were also reviewed. The search strings included variations of different search terms such as 'psychosocial problems', 'psychotherapeutic interventions', 'mindfulness-based interventions', 'stress management', 'psychosocial approaches', in addition to the key terms 'Neurodegenerative Disease', 'Multiple Sclerosis', 'Parkinson'. References cited by these articles were used to access other works. Studies were included in this descriptive review according to the following criteria: (1) a study sample of patients diagnosed with Parkinson's and Multiple Sclerosis; (2) psychosocial problems; (3) interventions involving psychosocial skills training, psychotherapeutic approaches, or stress management techniques.

## Multiple Sclerosis

MS, an autoimmune inflammatory demyelinating disease of the central nervous system, is a major cause of chronic neurological disability in young and middle-aged adults aged 18-50 years (Barten et al. 2010). It affects approximately 2.8 million people worldwide, and the overall prevalence rate is 36 per 100,000, with a higher incidence in women (MSIF 2020).

MS is associated with complex disorders, including muscle strength, sensory, coordination, balance, visual impairment, and cognitive impairment (Beer et al. 2012). In addition to physical disabilities such as motor weakness, spasticity, sensory dysfunction, visual loss, ataxia, individuals with MS face a wide range of psychosocial, behavioral and environmental problems and adverse conditions such as fatigue, pain, urinary incontinence, memory, attention, and executive dysfunctions (Khan et al. 2006). This situation causes progressive limitations in performing daily life functions and requires long-term multidisciplinary intervention. Studies show that factors such as disease onset, progressive disease course, multiple initial symptoms, pyramidal or cerebellar symptoms, and a short time between onset and first relapse are associated with poor prognosis (Khan et al. 2011).

MS has an unpredictable disease course, and its occurrence and prognosis vary considerably (Beer et al. 2012). These are the “relapsing-remitting” form, which progresses with exacerbations and attacks, and relapses that make up 80% of all MS cases; the “secondary progressive” form, in which this form transforms into the form in which progressive obstacles are acquired between attacks; and the “primary-progressive” form, which constitutes 15% of all MS cases and progresses with progressive disabilities from the onset (Amatya et al. 2013).

With the progression of the disease in individuals with MS, the negative effects of disorders and disabilities are gradually increasing. In addition, their care needs increase as they age with their existing disabilities. For all these reasons, rehabilitation processes are quite complex and comprehensive disease management is required. The aim of rehabilitation is to improve functional independence and increase participation by focusing on patient education and self-management (WHO 2011, Beer et al. 2012, Amatya et al. 2013). Although physiotherapy continues to dominate as a key component and most common rehabilitation intervention in MS, it should be part of a comprehensive and long-term multidisciplinary rehabilitation approach to sustain functional gains and social integration (WHO 2008).

MS treatment includes a variety of rehabilitation intervention strategies. Physiotherapy approaches such as stretching and strengthening exercises and endurance training are the most frequently used applications. In addition, specific rehabilitation programs such as hyperbaric oxygen therapy, subcutaneous electrical nerve stimulation, hippotherapy, vibration therapy, vocational rehabilitation, acupuncture, fatigue and spasticity management are also implemented. In recent years, psychological approaches such as mental and educational interventions have also been shown to be beneficial. There is a need for multidisciplinary rehabilitation programs that include a program coordinated by a team of health professionals, offered by two or more disciplines such as nursing, physiotherapy, occupational therapy, psychiatry, etc. (Amatya et al. 2017).

## Psychosocial Problems in Multiple Sclerosis

Although the exact etiology and pathogenesis of MS are not yet known, it is thought to be the result of viral, genetic, environmental, immunological and psychosocial factors (Rumrill et al. 1996). The role of psychosocial factors in the pathogenesis of MS is quite complex and may be a determinant for the onset of MS and is closely related to the development and symptoms of the disease (Liua et al. 2009). Conversely, MS symptoms can negatively affect the psychological state of patients. Symptoms such as pain, fatigue, emotional changes and cognitive impairment are closely related to psychosocial factors (Osborne et al. 2007). MS has extensive neuropsychiatric symptoms such as depression, cognitive impairment, anxiety, obsessions and weakness, fatigue, low self-esteem, sleep and concentration problems, in addition to a wide variety of important physical symptoms such as weakness in the extremity muscles, vertigo, ataxia, spasticity, and visual disturbances. (Latimer-Cheung et al. 2013, Marrie et al. 2015, Berrigan et al. 2016).

In order to cope with MS, individuals need to find ways to modify their lives to accommodate a wide and diverse range of disabilities. MS creates new needs, demands, and challenges, and individuals with MS experience unwanted role loss, relationship changes, and financial difficulties. These aspects of the disease have a direct impact on psychosocial life, leading to reduced QoL and difficulties in coping with negative situations (Guerra 2013).

Supportive interventions to improve the QoL among patients with MS should be multidimensional and provide physical, psychosocial and emotional benefits. However, the role of psychosocial care as a supportive intervention for patients diagnosed with MS is often neglected and its possible positive effects on QoL have not been fully elucidated (Hyarat 2018). However, there are studies showing that high psychosocial adjustment for various diseases is associated with high QoL (Kolokotroni et al. 2017). Providing psychosocial adjustment to MS can be helpful in coping with this chronic disease; thus, the difficult and personal experiences of the patient regarding their personal goals, values and beliefs are integrated with cognitive processes (Grech et al. 2107). Recently, great attention has been paid to improving the QoL in individuals with MS (Berrigan et al. 2016). In a study, it was shown that the increase in disability level with MS causes depression and anxiety symptoms, fatigue and physical comorbidity, and a decrease in health-related QoL (Berrigan et al. 2016). It has been reported that all interventions targeting modifiable factors such as depression, anxiety, fatigue and physical comorbidities can improve QoL (Berrigan et al. 2016). As a lifelong disease, MS causes many physical and mental disabilities.

These obstacles require various psychosocial adjustments to the patient at individual, familial and social levels. Along with the limitations in their skills and performance, they need to adapt to a new life (Wassem and Dudley 2003, Milanlioglu et al. 2014). It is supported by previous studies that the QoL of individuals with MS is impaired in the composition of their mental health, difficulty in maintaining social relationships and creating new ones, sexual inadequacy and sexual relationship problems, negative changes in family relationships, and difficulties in working life and performing leisure activities (Kolokotroni et al. 2017). Unemployment status, low education level, low income level, female gender, disease duration and relapse frequency are associated with low QoL in MS patients and high psychosocial adjustment is associated with high QoL. Identifying the negative factors that need to be considered for improvement, such as a state of uncertainty about the disease state perceived by the patient, cognitive disability and multiple drug use, can play a vital role in improving the QoL in these patients by improving psychosocial adjustment (Sullivan et al. 2004).

Knowing the clinical and sociodemographic variables associated with psychosocial adjustment and QoL in MS patients allows clinicians to identify the aspects that are most related to the patient's reaction to the disease and thus to determine the interventions to be targeted. It has been shown that factors such as high education and income level and full employment status have a positive effect on mental health in these individuals (Li et al. 2010). Studies have shown that male participants have better health-related QoL than female participants, female individuals have more concerns about emotional or psychological dimensions, while male participants are more concerned about the physical dimension of health than females (Northrup and Purkis 2001, Hyarat 2018).

Neuroimmunological studies have shown that lymphocytes and cytokines of MS patients can change under different stresses and these changes may have clinical significance. Studies have shown that psychosocial factors such as stress are closely related to MS attacks (Strenge 2001). Most studies have shown that acute short-term stress has no adverse effect on MS progression and severity. However, chronic psychosocial stresses such as interpersonal conflicts, loss of loved ones, lack of social support, anxiety and depression have been defined as risk factors for exacerbating symptoms (Osborne et al. 2007). When the patients were assessed under stressful life events, depression, anxiety, fatigue and other conditions during the 2-year follow-up of 101 MS patients in Australia, it was shown that the attacks were associated with the frequency of acute stresses, differences in psychological coping styles, and place of birth. Therefore, it was concluded that the number of individual stressors, rather than their severity, was the most important risk factor in predicting MS attacks, and it was reported that MS patients should avoid possible situations that could create multiple stresses. With this information, psychosocial factors are becoming a new field in etiology studies in autoimmune diseases (Brown et al. 2006).

## Psychosocial Approaches in Multiple Sclerosis Rehabilitation

### *Developing Strategies for Coping with the Sickness Situation*

Lifelong and difficult to predict, MS process and trajectory are highly individual. Therefore, it is important to examine and improve coping strategies for individuals with MS to adapt (Holland et al. 2019). Coping processes include cognitive and behavioral efforts needed in situations that burden the individual or exceed that the individual can use. These processes and efforts are important determinants of adapting to living with MS. Coping strategies are considered in two dimensions as adaptive and maladaptive (Caplan 1964). Many studies identify three main problem-focused coping strategies: 1- Resolving the effects of stressors: Strategies to re-understand or minimize the effects of stress; 2- Emotionally focused: Strategies that negatively affect emotional regulation; and 3- Avoidant: Strategies to avoid thinking and reality, and to make an effort to disturb oneself (Ode et al. 2009).

Various studies have shown that individuals with MS use maladaptive coping strategies that are more avoidant or emotionally focused, associated with more inadequate psychosocial adjustments such as emotional stress, poor general health, and depressive symptoms. (Holland et al. 2019). Coping methods positively or negatively affect the psychosocial and other disease outcomes of MS (Holland et al. 2019).

There is conflicting evidence that the use of different coping strategies is associated with demographic and disease characteristics. In studies, being young, being male, and having a diagnosis of relapsing-remitting MS were associated with higher substance use, which is a maladaptive coping method. It has been shown that young and male individuals use maladaptive coping strategies that can disrupt their psychosocial regulation more (Holland et al. 2019).

Women with MS use emotion-focused strategies, which can make compliance more difficult in the absence of adaptive strategies. In addition, being unemployed and having more disorders are associated with the use of strategies such as avoidance, letting go, and breaking with others that can significantly increase non-compliance. In addition, advanced age, presence of a partner, and short illness duration are associated with adaptive and more adaptive coping strategies (Holland et al. 2019). Using maladaptive coping methods in individuals with MS is indicative of higher levels of stress, depression, and anxiety, and lower QoL. Using adaptive coping methods, on the other hand, indicates lower stress frequency, depression and anxiety levels, and higher QoL (Grech et al. 2018).

Growth, maturation and acceptance are beneficial for psychosocial adjustment in individuals with chronic disease in general, and especially acceptance is an important component in the adaptation process to chronic disease for MS patients (Holland et al. 2019). It is an interesting paradox of psychologist Carl Rogers about self-development towards acceptance; "when I accept myself as I am, I can change". The ability to accept one's current personal situation enables one to focus on one's own resources in order to focus on achieving future goals (Maes et al. 1996). Therefore, individuals with MS may benefit from psychological treatments and interventions aimed at gaining acceptance of the disease and defining their personal gains as a result of their growth and maturation (Grech et al. 2018).

### *Reducing Fatigue*

Fatigue is a common symptom seen in over 70% of the MS population. MS-related fatigue is often recognized as the most debilitating symptom that significantly negatively impacts activities of daily living, social participation, QoL, and employment. Fatigue is a highly complex and multifactorial symptom that can be defined as "a subjective lack of physical and/or mental energy that interferes with usual and voluntary activities perceived by the patient or caregiver". Subjectively, it can be defined as a feeling of exhaustion, lack of energy or an overwhelming fatigue that can occur even at rest (Rooney et al. 2019).

Although fatigue can be experienced in general in MS patients, there is a higher prevalence in individuals with progressive forms of the disease (Maes et al. 1996). Primary pathological disease processes, including structural and functional central nervous system changes, and secondary factors independent of MS pathology are associated with the pathogenesis of fatigue. However, since the pathophysiological mechanisms underlying fatigue in MS are not well understood, current treatment strategies focus on non-pharmacological interventions and symptom management (Langeskov-Christensen et al. 2017).

Holistic rehabilitation programs that include interventions such as 'exercise', 'energy conservation management' and 'cognitive behavioral therapy' to manage MS-related fatigue have moderate and short-term positive effects on fatigue outcomes (Asano et al. 2014). A review showed that the literature on the use of exercise and behavioral rehabilitation interventions to manage the severity and adverse effects of fatigue in the progressive type MS population is insufficient (Rooney et al. 2019).

Vanage et al. (2003) showed that with an 8-week energy conservation training in patients with progressive type MS, the negative effects of fatigue were significantly reduced and the benefits were maintained after 8 weeks of follow-up. Bagosian et al. reported that there was no significant improvement in fatigue severity following 4 weeks of mindfulness training (2015). Mindfulness awareness techniques are used to manage somatic symptoms and improve health-related QoL in MS, and are recommended as an effective strategy to manage fatigue in the National Institute for Health and Care Excellence Guide, in England (Simpson et al. 2014, Langeskov-Christensen et al. 2017). However, the 'mindfulness awareness intervention' practiced by Bogosian et al. is designed to manage stress, not fatigue. Therefore, although it is known that there is a linear relationship between mood disorders and fatigue, the applicability of these interventions to fatigue management is limited. In addition, mindfulness training sessions via video conferencing may be appropriate for those with severe mobility disabilities. However, it has been reported that the social benefits that can be obtained with face-to-face group-based interventions can be limited during these practices (Rooney et al. 2019).

### *Increasing the Level of Participation in Exercise and Physical Activity, Motivation and Self-efficacy*

Despite recent advances in pharmacological treatments, exercise therapy remains the cornerstone of management of activity limitations in individuals with MS. There is increasing evidence showing that exercise has positive effects on many disorders, activity limitations and participation restrictions in individuals with MS (Coote et al. 2014). Systematic reviews and meta-analyses show that exercise has positive effects on muscle strength, aerobic capacity, mobility, QoL and fatigue, and proves to be safe. However, despite the increase in evidence showing the beneficial effects of physical activity and exercise, there is evidence that individuals with MS are less active than healthy individuals and individuals with different health conditions (Coote et al. 2014). This seems worrisome, given that reduced levels of physical activity are associated with reduced QoL and increased risk of cardiovascular disease. In addition, a recent study showed that individuals with MS are in the risk group for death by 2.4 times more than the general population due to cardiovascular disease, and stated that this may be related to being physically inactive (Coote et al. 2014).

A randomized controlled trial evaluating the efficacy of community exercise interventions in individuals with MS with minimal gait impairment demonstrated significant benefits from exercising in the community. In the study, exercise interventions performed under the supervision of a physiotherapist were composed of combined aerobic and strength training components. With this exercise intervention, significant improvements were achieved in the physical and psychological functions, fatigue level and walking endurance of MS. However, it was stated that these improvements could not be sustained in the long term and the effect on the primary outcome measure, walking capacity, was no longer significant 12 weeks after the intervention (Coote et al. 2014). Therefore, there is a need for studies investigating factors that will increase long-term compliance and facilitate positive changes in physical activity behavior in order to provide detailed information about sustainable exercise interventions in individuals with MS (Garrett et al. 2013).

In recent years, it has been emphasized that the presence of fatigue, depression, and anxiety in individuals with MS are associated with disease outcomes, including strength, balance, mobility limitations, and reduced QoL. For this reason, in recent years, there has been a great interest in behavioral approaches to increase physical activity in individuals with MS. Such behavioral approaches often focus on identifying constructs that can be modified through targeted interventions in relation to physical activity. In a recent review, it is said that future studies should continue to focus on psychosocial constructs such as self-efficacy, goal-oriented regulation, and determination of outcome expectations in order to increase the effectiveness of physical activity interventions (Ellis et al. 2013, Casey et al. 2017).

In the literature so far, 'Social-Cognitive Theory' (SBT) has been the most consistently applied method to increase physical activity in MS, and its central agent, 'self-efficacy', has been associated with physical activity in all aspects. This has led to the design of successful behavioral interventions to increase physical activity in MS. However, the relationship between self-efficacy and physical activity may vary depending on the severity of the clinical symptoms of MS and how these symptoms affect the sources of self-efficacy (Motl 2014).

Resources used in terms of the concept of self-efficacy include 'mastery experience', 'vicarious experience', 'verbal persuasion' and 'emotional regulation'. For example, self-efficacy is strongly associated with physical activity, especially in individuals with MS who have severe fatigue, as self-confidence is strongly associated with behavior under very challenging conditions. Resources used in terms of the concept of self-efficacy include 'mastery', 'significant experience', 'verbal persuasion' and 'emotional stimulation'. For example, self-efficacy is strongly associated with physical activity, especially in individuals with MS who have severe fatigue, as self-confidence is strongly associated with behavior under very challenging conditions. Mastery and thus self-efficacy will increase, if an individual is successful under challenging physiological conditions and behaves successfully in performance (Casey et al. 2018).

The high prevalence of fatigue in individuals with MS may adversely affect the mastery of physical activity behavior and thus self-sufficiency, as well as symptoms such as walking ability and gait being negatively affected. In addition, the presence of depression and/or anxiety may induce negative emotions that may affect self-efficacy while coping with specific situations, such as trying to change physical activity behaviors positively (Casey et al. 2018). Individuals with MS experience depression at a rate of 23.7% and anxiety at a rate of 44%, and psychosocial symptoms, especially inadequacy of self-efficacy and the presence of anxiety, are shown as the cause of inadequate physical activity behavior in individuals with inactive MS (Casey et al. 2018).

Social Cognitive Theory (SBT) is one of the most widely accepted theoretical frameworks in the literature for understanding and optimizing physical activity and other health behaviors. Accordingly, researchers have developed a study program investigating SBT-based behavior change intervention (Coote et al. 2014). The intervention consists of a program aimed at increasing 'exercise self-efficacy' and focusing on increasing knowledge of physical activity participation based on the SBT principles of outcome expectations, self-efficacy, barriers and goal setting. Studies have shown that individuals who complete SBT-based interventions attend more exercise sessions than individuals in the standard care control group (Coote et al. 2014). In a later study in which SBT was used as an online service intervention, a significant increase in the number of accelerometer steps was obtained, and positive effects were observed on the level of physical activity as assessed by the 'Godin Leisure Exercise Questionnaire' (Dlugonski et al. 2011). Individual support of the program with video coaching during and after the training increased physical activity even more, and this change was maintained 12 weeks after the intervention (Motl and Dlugonski 2011). Considering the positive effects of these two separate but complementary studies, it has been shown that the application of a combination of exercise and SBT-based behavior change approaches is likely to further improve and maintain health outcomes in individuals with MS (Coote et al. 2014). In one of the studies, the stages of SBT-based education were described in detail (Coote et al. 2014). SBT-based training sessions in the study are supplemented by physiotherapists trained in the field after each exercise session and incorporate key elements of SBT, including self-efficacy, outcome expectations, barriers, and goal setting. The first session consisted of a discussion on the benefits of exercise for individuals with MS. Its content includes instructions for starting an exercise program; the individual's physical and social self-evaluation of the results of the intervention and mental outcome expectations; and training in selfmonitoring behavior with the use of exercise diaries and pedometers. In the second session, group discussion took place under the guidance of a physiotherapist on individual, measurable, adjustable, activity-oriented, realistic and time-based exercise arrangements and determining physical activity goals. In the third session, within the scope of the concept of 'self-efficacy', the focus was on the sources of self-efficacy under the titles of achieving feats that require mastery, social modeling, social persuasion and interpretation of physiological states. The fourth session consisted of discussion and documentation of the environmental, social, health and cognitive and behavioral barriers and facilitators present in performing the exercise. The fifth session focused on the concept of long-term preservation of a physically active lifestyle. The final training session included a celebratory ceremony for participants to praise the successful completion of the exercise program.This program includes presentation notes, individual reflection, and written exercises, group discussion on each principle of SBT, and providing ongoing feedback on all aspects of PA behavior, as well as video files of individuals with MS who discuss PA behavior and their experiences in initiating and maintaining a physical lifestyle. The program is based on an SBT principle where the promotion of self-efficacy through the use of video files of individuals with MS, social modeling and social persuasion is at the center. During the weeks when the participants did not attend group sessions, coaching was provided via phone calls. These coaching calls are composed of guided interviews that take into account the SBT components presented in the previous session and a review of other components. Participants also received coaching calls to review the topics covered during the exercise program and to act as support for long-term maintenance of a physically active lifestyle by phone after the program was completed. This whole implementation process significantly increased the physical activity levels of the participants (Coote et al. 2014).

## Parkinson's Disease

Parkinson's disease (PD) is one of the most common neurodegenerative diseases affecting 1-2% of the population over 65 years of age. With increasing life expectancy and an aging population, it is estimated that by 2050 the estimated prevalence of PD will increase by twice the estimated prevalence. The neuropathology of PD was described more than 40 years ago. However, as PD is idiopathic and its treatment is not fully and definitively available, it contributes significantly to the health and socio-economic burden (Kwok et al. 2016).

PD is a neurodegenerative disease that occurs in the basal ganglia with the early significant death of the substantia nigra pars compacta (SNPC) and other dopaminergic pigmented neurons in the brain stem, and it accounts for 80% of all parkinsonism cases. The main 4 main clinical motor features are resting tremor, bradykinesia, rigidity and postural reflex disorder (Bulut 2016). As the disease progresses, gait disturbance, postural instability, decrease in physical functionality and significant motor defects resulting in difficulties in daily life occur (Genever et al. 2005). The main management of PD is symptomatic treatment with drugs that increase dopamine concentrations or directly stimulate dopamine receptors. However, PD can affect neurotransmitters other than dopamine and regions of the nervous system other than the basal ganglia (Kalia and Lang 2015).

Previously, it was thought that PD was primarily caused by environmental factors, but studies now reveal that the disease arises as a result of a complex interaction of genetic factors and the environment. Therefore, PD is currently seen as a slowly progressive neurodegenerative disease that begins years before diagnosis, affects multiple neuroanatomical areas, results from a combination of genetic and environmental factors, and presents with a wide variety of symptoms (Kalia and Lang 2015). Although motor symptoms of PD have been described, little is known about non-motor symptoms, although they are common. Therefore, non-motor symptoms that cannot be treated effectively are among the priority areas to be investigated in PD (Weintraub et al. 2004). In a study, it was reported that more than 62% of patients had non-motor symptoms such as pain, apathy, sexual function, stool incontinence and sleep disturbances during consultations. However, it has been shown that these symptoms are not noticed by neurologists and health professionals due to the embarrassment of the patient or the failure to realize that they are related to PD. Many non-motor symptoms can be treated, but if ignored, they may cause significant QoL problems and require hospitalization (Chaudhuri and Schapira 2009).

### Psychosocial Problems in Parkinson's Disease

PD is classically defined as movement disorder, but non-motor symptoms including cognitive, mood, autonomic and sleep disorders are seen both in the premotor stage of the disease and throughout its course (Bulut 2016). The premotor or prodromal phase of the disease may be characterized by impaired smell, constipation, depression, excessive daytime sleepiness, and sleep behavior disorder with rapid eye movements. It has been shown that mood disorders and constipation almost double the risk of developing PD in the future (Postuma et al. 2012). The premotor phase may be prolonged; for example, the average delay between the onset of sleep behavior disorders and the onset of motor symptoms of PD can be 12-14 years (Noyce et al. 2012). The pathogenic process that causes PD is presumed to begin and continue during the premotor phase, as the SNPC also involves regions of the peripheral and central nervous system in addition to dopaminergic neurons. Therefore, it is thought that this prodromal period is a useful process to "prevent" or "delay" the development and progression of the disease, and may provide a potential delaying door opportunity to apply modifying treatments for the disease (Kalia and Lang 2015).

Anxiety and depression are common non-motor symptoms in PD. This situation results from the loss of body control, the feeling of inability to self-sufficient and self-expression, as well as the frustration that occurs with the loss of the capacity to perform activities of daily living independently (Simpson et al. 2014). Stress arising from ineffective coping methods and uncertainty in their lives remain major challenges for individuals with PD (Soundry et al. 2014). These impairments in their physical, cognitive and functional capacities significantly increase the need for help and the cost of care for the PD population (Kwok et al. 2016).

## Psychosocial Approaches in Parkinson's Disease Rehabilitation

Although depression treatment in PD has been shown to improve QoL, depression in PD is not adequately defined and cannot be adequately treated. Interventional studies for depression and anxiety in PD are extremely limited. Among drug treatments, the most commonly prescribed antidepressants in PD are selective serotonin reuptake inhibitors (SSRIs) and tricyclic antidepressants (TCAs). Unfortunately, SSRIs can cause worsening of PD symptoms in some patients. Side effects of TCA such as orthostatic hypotension, sedation and anticholinergic effects may cause negative consequences such as increasing cognitive problems seen in PD.

Other somatic therapies, such as electroconvulsive therapy (ECT) and transcranial magnetic stimulation (TMS), may help with severe and refractory depression, but access or admission criteria for these interventions may be limited and have not been conclusively proven beneficial for PD. Psychosocial treatments include specific forms of psychotherapy, social and vocational training that help provide support, education and guidance to individuals with emotional or mental problems. Psychosocial approaches are especially needed in individuals with PD who have inadequate response or intolerance to traditional antidepressant drug treatments (Yang et al. 2012).

### *Practicing Mind-Body Exercises*

The National Institutes of Health states that mind-body interventions focus on interactions between mind, body, and behavior. It is believed that the interaction of emotional, mental, social, spirituality and behavioral factors directly affects our health (Kwok et al. 2016). Mind-body interventions increase the body's self-consciousness, thereby increasing the individual's energy, mental clarity, concentration and ability to tolerate physical discomfort (Morone and Greco 2007). Mind-body interventions can be categorized as relaxation, concentration, or movement-based. Relaxation-based mind-body interventions often require training in repetitive relaxation techniques, in which a physiological response is produced. This physiological response increases body awareness and resilience to stress. Commonly used examples include progressive muscle relaxation techniques and biofeedback training (Kwok et al. 2016). Concentration-based mind-body interventions require a high level of attention to direct the mind to specific thoughts or images using minimal thinking activity. Common examples include mindfulness, meditation, guided imagery, and hypnosis. At the same time, movement-based mind-body interventions consist of low-intensity exercises that increase mind-body coordination and awareness with the application of a controlled sequence of movements and focusing attention (Scure et al. 2008, Kwok et al. 2016).

A recent systematic review of non-pharmacological PD treatment reveals that movement-based mind-body exercises are widely adopted by the PD population as a complementary and alternative therapy (Hindle 2013). It has been shown that mind-body exercises have positive effects on disease management and improving QoL in individualas with various chronic diseases such as depression, stress and anxiety, acute and chronic pain, cardiovascular diseases and hypertension (Hassed 2013). However, the effects of mind-body exercises on the physiological and psychosocial health of PD have not been adequately reviewed and have been inconclusive. Although there has been increased interest in investigating the effects of mind-body exercises on individuals with chronic diseases in recent years, insufficient effort has been made to systematically review their effects on the PD population (Kwok et al. 2016).

Physical exercise is recommended to help maintain balance and functional mobility and improve feelings of well-being and health in PD, regardless of the stage and severity of the disease (Kwok et al. 2016). There is evidence that dance interventions such as modern dance or tango applied in PD in recent years improve the QoL with improvements in the individual's activity and participation. In particular, it has been shown that this improvement is associated with the improvement of the individual's mobility and the increase in the social support given to the individual (Sharma et al. 2015). In addition, it has been reported that there is a tendency towards improvement in depression levels when individuals with PD are evaluated with appropriate depression scales such as the Geriatric Depression Scale as a result of applied yoga interventions (Hindle et al. 2013). However, there is insufficient evidence that yoga interventions improve QoL (Sharma et al. 2015).

As the disease progresses, the increase in motor function deficits in PD further hinders their ability to perform activities of daily living. Uncertainty about the future course of the disease is the most frequently thought of by PD (Hatano et al. 2009). Mind-body exercises have important effects on improving motor symptoms and functional mobility in mild to moderately affected PD. Tai Chi and dance and yoga interventions show beneficial effects in improving motor symptoms; especially yoga has the greatest effect on improving motor symptoms for individuals at level III according to the Unified Parkinson's Disease Rating Scale (Kwok et al. 2016).

Studies show that an average dose of 60 minutes of movement-based mind-body exercise therapy per session twice a week for 10 weeks has a large and significant effect in reducing motor symptoms. However, with high-dose interventions, compliance with the interventions may decrease in relation to the inadequate condition of these individuals. At high doses, patients do not feel safe and physical intolerance occurs, so that improvement in motor symptoms cannot be achieved. Therefore, it is said that inclusion of similar home-based practices can be considered to increase gains, encourage participation and increase compliance in the PD population (Pickering et al. 2013).

Multidimensional gains, including psychosocial aspects, can be achieved by applying mind-body exercises in mild and moderately affected PD. Individuals' interest and motivation are high in performing mind-body exercises, especially in yoga studies (Kwok et al. 2016).

There is insufficient evidence showing the effects of mind-body exercises on psychosocial health, including increasing self-consciousness over the body control inherent in the implementation of mind-body interventions in PD, as well as providing a more peaceful and relaxed mental state, and there is a need for well-designed randomized controlled studies. Mind-body exercises are shown as viable and acceptable complementary and alternative treatments for PD. The main reason for the inclusion of a small number of participants, which is related to the inadequacy of the studies, was shown as the lack of transportation support (Kwok et al. 2016).

### *Other Psychosocial Approaches*

Numerous studies have been published showing the difficulties and psychosocial changes experienced by individuals with PD in their lives. Similarly, recent studies have emphasized that family members caring for individuals with PD feel significantly affected by their own health and QoL, as patients are highly dependent on their caregivers while continuing to carry out activities of daily living (Navarta-Sánchez et al. 2018). Considering all these, it is seen that the limited and non-comprehensive approaches offered by the Primary Health Care Services to those with PD and their caregivers are insufficient to encourage them to adapt to the changes they experience as a result of the existing long-term disease process (Navarta-Sánchez et al. 2018).

According to the evidence, gender, education, coping strategies, social networks or culture are social and personal factors that may facilitate or hinder psychosocial adjustment (Navarta-Sánchez et al. 2018). In particular, coping strategies have been identified as a key factor in improving and developing psychosocial adjustment in different long-term disease conditions and PD (Navarta-Sánchez et al. 2018). The reason for this is that coping is the key mechanism of the psychosocial adaptation process in helping the individual with PD and the caregiver family seek balance in their lives and gaining better outcomes in terms of QoL. Coping methods such as having a positive personality while facing the changes, gaining a positive perspective, establishing dynamics such as acceptance, living in the moment, participating in activities, normalizing the situation, and leading a normal life, which are necessary to protect from negative influences seems to be beneficial in reversing the condition to reduce the harmful consequences of the disease (Navarta-Sánchez et al. 2018).

Currently, very few interventions aiming to improve coping skills and psychosocial adjustment to PD are available in the literature. However, changes in the development of coping skills and psychosocial adjustment to PD were not directly measured in these studies. In order to cope with difficulties in clinical practice, it is essential to develop and evaluate psychoeducational interventions that will help and motivate individuals with PD and their caregiver family members in adopting coping skills that will lead to better psychosocial adjustment to PD (Navarta-Sánchez et al. 2018).

Although neuropsychiatric symptoms include cognitive impairment and dementia, they can become dominant in the later stages of PD and affect social participation. There is an increasing interest in the effects of non-pharmacological interventions on cognitive functions in neurological and psychiatric conditions (Hindle et al. 2013). It has been shown that cognitively focused interventions, including cognitive training, exercise and physical therapies, cognitive and physical interventions, and brain stimulation techniques in PD, can play a role in preventing or delaying the onset of cognitive impairment and dementia by improving cognitive reserve. Cognitive education, physical activity, and cognitive and non-physical leisure activities can reduce the risk of cognitive decline and Alzheimer's (Hindle et al. 2013). Cognitive training includes regular guided practice on standard tasks that focus on specific aspects of cognitive function. Exercise can improve brain function by influencing many mechanisms such as cardiorespiratory fitness, auditory attention, and cognitive speed improvement in relation to the improvement of motor function. Combining exercise with cognitive interventions can increase the benefits (Hindle et al. 2013).

## Conclusion

In the literature review, it has been seen that psychosocial approaches such as therapeutic interventions for psychosocial adaptation and adoption of adaptive coping strategies, application of cognitive and social behavioral therapy methods, concentration and movement-based mind-body exercises are effective in the rehabilitation of neurodegenerative diseases. Previous studies have shown that psychosocial factors are closely related to neurodegenerative diseases both before the onset of the disease and with the development and progression of the disease.

Psychosocial influences including many factors such as anxiety, depression, cognitive impairment, fatigue, lack of self-confidence, sleep and concentration problems have been shown to adversely affect the clinical symptoms and QoL of individuals with these diseases. For all these reasons, although medical treatments and physiotherapy interventions are seen as key components in the rehabilitation of neurodegenerative diseases, it is thought that psychosocial approaches should be part of a comprehensive and long-term multidisciplinary rehabilitation approach in order to maintain functional gains and social reintegration. In order to cope with their disease, patients with neurodegenerative disorders need to find ways to modify their lives according to their wide and diverse range of disabilities and disabilities. In the rehabilitation process, psychosocial approaches have been shown to have benefits such as reducing psychosocial symptoms such as anxiety and depression, improving QoL, facilitating adaptation to difficult and personal experiences and new lives, improving relationships, increasing employment, reducing fatigue, improving sleep quality and physical functions, increasing participating in exercise and physical activity, and the level of motivation and self-efficacy. It has been reported that more evidence-based studies are needed.

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