

NEUROREHABILITATION THROUGH EXERCISE IN PARKINSON'S DISEASE PATIENTS

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Abstract

Aim. The aim of this study is to examine the possibility that Parkinson's disease patients can have a non-pharmaceutical alternative for improving their quality of life.

Methods. This pilot study involved the observation of Parkinson's disease patients who completed a 6 months physical training programme. Patients were evaluated using the motor part of the UPDRS (UPDRS III), the Parkinson's Disease Quality of Life questionnaire, the Hoehn and Yahr scale, the Lindop Parkinson's Assessment Scale, the Modified Bradykinesia Rating Scale, the Unified Dyskinesia Rating Scale, the Hospital Anxiety and Depression Scale, the Parkinson's Disease Fatigue Scale, the Epworth Sleepiness Scale and the Parkinson's Sleep Scale at the beginning and at the end of the study.

Results. Six Parkinson's disease patients improved their quality of life and their motor score according to the results from their tests on the Unified Parkinson's Disease Rating Scale.

Conclusions. Based on this clinical study, the idea of neurorehabilitation through physical exercises in the Parkinson's disease patients' routine can make a real impact on improving their quality of life.

Keywords: Parkinson's disease, neurorehabilitation, physical exercise.

Introduction

Parkinson's disease represents one of the most prevalent neurodegenerative disease in the world, after Alzheimer disease, with an incidence between general population of 0.3%. The most relevant risk factor for the occurrence of Parkinson's disease is the phenomenon of aging, with the estimation of occurrence at 1% in the population over 60 years old and with an occurrence of 4% in the population over 80 years. Even though initially considered a "movement" impairment, the last studies in the literature considered Parkinson's disease a "multi-system" neurodegenerative disease.

The clinical components of Parkinson's disease are multi focal, with the reference of being mostly "motor" and "non-motor" features. The principal objective signs that are vital for to the clinical diagnosis of Parkinson's disease are bradykinesia, muscle rigidity, resting tremor and postural instability. Nonmotor components include mood disorders, dementia, visual illusions, constipation, urinary symptoms, orthostatic hypotension and sleep disorders. These features have an important influence in the patient's quality of life and in independent living.

Nowadays the in-existence of medications

demonstrated to decrease the neurodegenerative process of Parkinson's disease, make the medical treatment to be mostly symptomatic. Even though in the initial stages of the disease the efficiency of the pharmacological therapy is capable to maintain a favorable outcome, some difficulty may occur, mostly related to the side-effects of the treatment which is impelling for the patients to seek for other treatment strategies during the disease's progression.

Parkinson's disease possesses a progressive direction in an indefinite period of time. The life expectancy is decreased from the moment of diagnosis. The upraising mortality is mostly correlated with the development of the association of Parkinson's disease with dementia. Dementia has become a frequent complication of Parkinson's disease, being prevalent in a rate of 25-40% amongst Parkinson's disease patients. Amongst the Parkinson's disease features, the motor deficits are debilitating because of the impact on the gait and balance that causes an increased risk of falling and mechanical fractures with decreased independence. A beneficial influence of the risk of falls is difficult to obtain through development of the gait's balance by dopaminergic therapy.

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Methods

In this pilot study, 6 patients with stage III Parkinson's disease were recruited (3 males and 3 females). The patients were diagnosed by doctor Docu Axelerad Any in the doctor's private clinic and observed and treated over time. The selection criteria followed: no clear signs of dementia (Mini-Mental State Examination [MMSE] score > 24, Mini Mental State Examination Score, MMSE>18). All patients signed the informed consent. Patients were evaluated before and after the six months period of home exercises. Patients were evaluated using the motor part of the UPDRS (UPDRS III), the Parkinson's Disease Quality of Life (PDQ-39) questionnaire, Hoehn and Yahr scale, Lindop Parkinson's Assessment Scale, Modified Bradykinesia Rating Scale, Unified Dyskinesia Rating Scale, Hospital Anxiety and Depression Scale, Parkinson's Disease Fatigue Scale, Epworth Sleepiness Scale and Parkinson's Sleep Scale at the beginning and at the end of the study.

Group sessions were held under the guidance of a neurologist and a physiotherapist. Home exercise instructions and a specific DVD were offered to each patient and their caregiver. Home exercises were chosen by the neurologist and physiotherapist team into home exercises that could be performed at home, with the attendance of everyone's caregiver.

The first patient, C.C., male, 60 years, diagnosed with Parkinson's disease for 14 years, had loss of his balance most time for the day, but without falls, along with slowness of the movements. The patient was still fully independent in his daily living activities, such as dressing, hygiene, and eating. The patient presented a tremor of his all limbs, being more emphasized on the left side. Also, the patient had rigidity and bradykinesia. The non-motor symptoms of the patient were the following: difficulties in cognition, reasoning and concentration; sleep problems with daytime tiredness; apathy and depression; constipation and sometimes general pain. Results before the physical exercises at home: At the part III of UPDRS Scale test the patient obtained 32 points. The patient was in stage III on Hoehn and Yahr scale. The patient obtained 12 points at the gait mobility of Lindop Parkinson's Assessment Scale and 11 points at the bed mobility of Lindop Parkinson's Assessment Scale. At the Modified Bradykinesia Rating Scale test, the patient obtained the score of 2, having a moderate, reduction in amplitude visible early in performance but continuing to maintain 50% of amplitude through most of the tasks. At the Unified Dyskinesia Rating Scale test, the patient was classified for mild dyskinesia. At the Hospital Anxiety and Depression Scale (HADS) test, the patient obtained 17 points, being a candidate for moderate depression and anxiety. At the Parkinson's Disease Fatigue Scale test, the patient obtained 64 points, classifying him for moderate fatigue. At the Epworth Sleepiness Scale (ESS) test, the patient obtained 13 points, classifying him for moderate-excessive daytime sleepiness. The patient obtained 65 points at the Parkinson's Sleep

Scale test. After the six months of physical training by practicing exercises at home, the patient obtained the following results: at the part III of UPDRS Scale test, his result was decreased by 3 points. The patient remained in stage III of Hoehn and Yahr scale. Also, the patient obtained 14 points at the gait mobility of Lindop Parkinson's Assessment Scale test and 12 points at the bed mobility of Lindop Parkinson's Assessment Scale test. His result on the Modified Bradykinesia Rating Scale test was unchanged. At the Unified Dyskinesia Rating Scale test, the patient was still classified for mild dyskinesia. At the Hospital Anxiety and Depression Scale (HADS) test, the patient has decreased his result by 4 points, showing a reduction in his depression and anxiety. At the Parkinson's Disease Fatigue Scale test, the patient obtained 60 points, presenting a reduction in his fatigability. The patient obtained 11 points at the Epworth Sleepiness Scale (ESS) test, now being classified for mild excessive daytime sleepiness. The quality of his sleep has been increased after the six months, having a result of 60 points at the the Parkinson's Sleep Scale test.

The second patient, D.A., female, 63 years, diagnosed with Parkinson's disease for 17 years, had balance impairments, but with rare falls, along with slowness of the movements. The patient was still mostly independent in her daily living activities, such as dressing, hygiene, and eating. The patient had a tremor of all her limbs, being more emphasized on the right side. Also, the patient had rigidity and bradykinesia mostly on the right side. The non-motor symptoms of the patient were the following: difficulties in thinking, multi-tasking and concentration; sleep problems with daytime tiredness; apathy and depression and constipation. Results before the physical exercises at home: At the part III of UPDRS Scale test the patient obtained 34 points. The patient was in stage III on Hoehn and Yahr scale. The patient obtained 10 points at the gait mobility of Lindop Parkinson's Assessment Scale and 10 points at the bed mobility of Lindop Parkinson's Assessment Scale. At the Modified Bradykinesia Rating Scale test, the patient obtained the score of 2, having a moderate, reduction in amplitude visible early in performance but continuing to maintain 40% of amplitude through most of the tasks. At the Unified Dyskinesia Rating Scale test, the patient was classified for mild dyskinesia. At the Hospital Anxiety and Depression Scale (HADS) test, the patient obtained 19 points, being classified for moderate depression and anxiety. At the Parkinson's Disease Fatigue Scale test, the patient obtained 67 points, classifying her for moderate fatigue. At the Epworth Sleepiness Scale (ESS) test, the patient obtained 15 points, classifying her for moderate-excessive daytime sleepiness. The patient obtained 65 points at the Parkinson's Sleep Scale test. After the six months of physical training by practicing exercises at home, the patient obtained the following results: at the part III of UPDRS Scale test, her result was decreased

by 2 points. The patient remained in stage III of Hoehn and Yahr scale. Also, the patient obtained 12 points at the gait mobility of Lindop Parkinson's Assessment Scale test and 11 points at the bed mobility of Lindop Parkinson's Assessment Scale test. Her result on the Modified Bradykinesia Rating Scale test was the same. At the Unified Dyskinesia Rating Scale test, the patient was still classified for mild dyskinesia. At the Hospital Anxiety and Depression Scale (HADS) test, the patient has decreased his result by 3 points, showing a reduction in her depression and anxiety. At the Parkinson's Disease Fatigue Scale test, the patient obtained 64 points, presenting a reduction in his fatigability. The patient obtained 12 points at the Epworth Sleepiness Scale (ESS) test, now being classified for mild excessive daytime sleepiness. The quality of his sleep has been increased after the six months, having a result of 60 points at the the Parkinson's Sleep Scale test.

The third patient, F.I., male, 59 years, diagnosed with Parkinson's disease for 10 years. The patient was still almost fully independent in his daily living activities, such as dressing, hygiene, and eating. The patient presented a tremor of his all limbs, being more emphasized on the right side. Also, the patient had rigidity and bradykinesia. The non-motor symptoms of the patient were the following: difficulties in thinking, carrying out activities and concentration; sleep problems with daytime tiredness; apathy and depression and genitourinary problems. Results before the physical exercises at home: At the part III of UPDRS Scale test the patient obtained 30 points. The patient was in stage III on Hoehn and Yahr scale. The patient obtained 10 points at the gait mobility of Lindop Parkinson's Assessment Scale and 9 points at the bed mobility of Lindop Parkinson's Assessment Scale. At the Modified Bradykinesia Rating Scale test, the patient obtained the score of 2, having a moderate, reduction in amplitude visible early in performance but continuing to maintain 50% of amplitude through most of the tasks. At the Unified Dyskinesia Rating Scale test, the patient was classified for mild dyskinesia. At the Hospital Anxiety and Depression Scale (HADS) test, the patient obtained 19 points, being integrated for moderate depression and anxiety. At the Parkinson's Disease Fatigue Scale test, the patient obtained 65 points, classifying him for moderate fatigue. At the Epworth Sleepiness Scale (ESS) test, the patient obtained 11 points, classifying him for moderate-excessive daytime sleepiness. The patient obtained 62 points at the Parkinson's Sleep Scale test. After the six months of physical training by practicing exercises at home, the patient obtained the following results: at the part III of UPDRS Scale test, his result was decreased by 1 points. The patient remained in stage III of Hoehn and Yahr scale. Also, the patient obtained 11 points at the gait mobility of Lindop Parkinson's Assessment Scale test and 11 points at the bed mobility of Lindop Parkinson's Assessment Scale test. His result on the Modified Bradykinesia Rating Scale test was

unchanged. At the Unified Dyskinesia Rating Scale test, the patient was still classified for mild dyskinesia. At the Hospital Anxiety and Depression Scale (HADS) test, the patient has decreased his result by 2 points, showing a reduction in his depression and anxiety. At the Parkinson's Disease Fatigue Scale test, the patient obtained 62 points, presenting a reduction in his fatigability. The patient obtained 10 points at the Epworth Sleepiness Scale (ESS) test, now being classified for higher than normal excessive daytime sleepiness. The quality of his sleep has been increased after the six months, having a result of 61 points at the the Parkinson's Sleep Scale test.

The fourth patient, H.I., male, 66 years, diagnosed with Parkinson's disease for 11 years, had loss of his balance most time for the day, but without falls, along with slowness of the movements. The patient was still fully independent in his daily living activities, such as dressing, hygiene, and eating. The patient presented a tremor of his all limbs, being more emphasized on the right side. Also, the patient had rigidity and bradykinesia. The non-motor symptoms of the patient were the following: difficulties in concentration and foggy thinking; sleep problems with daytime tiredness; apathy and depression; constipation and apathy. Results before the physical exercises at home: At the part III of UPDRS Scale test the patient obtained 35 points. The patient was in stage III on Hoehn and Yahr scale. The patient obtained 10 points at the gait mobility of Lindop Parkinson's Assessment Scale and 10 points at the bed mobility of Lindop Parkinson's Assessment Scale. At the Modified Bradykinesia Rating Scale test, the patient obtained the score of 2, having a moderate, reduction in amplitude visible early in performance but continuing to maintain 50% of amplitude through most of the tasks. At the Unified Dyskinesia Rating Scale test, the patient was classified for mild dyskinesia. At the Hospital Anxiety and Depression Scale (HADS) test, the patient obtained 19 points, being a candidate for moderate depression and anxiety. At the Parkinson's Disease Fatigue Scale test, the patient obtained 66 points, classifying him for moderate fatigue. At the Epworth Sleepiness Scale (ESS) test, the patient obtained 16 points, classifying him for severe-excessive daytime sleepiness. The patient obtained 65 points at the Parkinson's Sleep Scale test. After the six months of physical training by practicing exercises at home, the patient obtained the following results: at the part III of UPDRS Scale test, his result was decreased by 2 points. The patient remained in stage III of Hoehn and Yahr scale. Also, the patient obtained 12 points at the gait mobility of Lindop Parkinson's Assessment Scale test and 11 points at the bed mobility of Lindop Parkinson's Assessment Scale test. His result on the Modified Bradykinesia Rating Scale test was unchanged. At the Unified Dyskinesia Rating Scale test, the patient was still classified for mild dyskinesia. At the Hospital Anxiety and Depression Scale (HADS) test, the patient has decreased his result by 2 points, showing a

reduction in his depression and anxiety. At the Parkinson's Disease Fatigue Scale test, the patient obtained 63 points, presenting a reduction in his fatigability. The patient obtained 14 points at the Epworth Sleepiness Scale (ESS) test, now being classified for moderate excessive daytime sleepiness. The quality of his sleep has been increased after the six months, having a result of 60 points at the the Parkinson's Sleep Scale test.

The fifth patient, M.M., female, 61 years, diagnosed with Parkinson's disease for 14 years, had loss of her balance most time for the day, but without falls, along with slowness of the movements. The patient was still fully independent in her daily living activities, such as dressing, hygiene, and eating. The patient presented a tremor of her limbs, being more emphasized on the left side. Also, the patient had rigidity and bradykinesia. The non-motor symptoms of the patient were the following: difficulties in cognition, reasoning and concentration; sleep problems with daytime tiredness; apathy and depression; constipation and genitourinary problems. Results before the physical exercises at home: At the part III of UPDRS Scale test the patient obtained 31 points. The patient was in stage III on Hoehn and Yahr scale. The patient obtained 11 points at the gait mobility of Lindop Parkinson's Assessment Scale and 11 points at the bed mobility of Lindop Parkinson's Assessment Scale. At the Modified Bradykinesia Rating Scale test, the patient obtained the score of 2, having a moderate, reduction in amplitude visible early in performance but continuing to maintain 50% of amplitude through most of the tasks. At the Unified Dyskinesia Rating Scale test, the patient was classified for mild dyskinesia. At the Hospital Anxiety and Depression Scale (HADS) test, the patient obtained 18 points, being a candidate for moderate depression and anxiety. At the Parkinson's Disease Fatigue Scale test, the patient obtained 65 points, classifying her for moderate fatigue. At the Epworth Sleepiness Scale (ESS) test, the patient obtained 14 points, classifying her for moderate-excessive daytime sleepiness. The patient obtained 64 points at the Parkinson's Sleep Scale test. After the six months of physical training by practicing exercises at home, the patient obtained the following results: at the part III of UPDRS Scale test, her result was decreased by 2 points. The patient remained in stage III of Hoehn and Yahr scale. Also, the patient obtained 12 points at the gait mobility of Lindop Parkinson's Assessment Scale test and 11 points at the bed mobility of Lindop Parkinson's Assessment Scale test. Her result on the Modified Bradykinesia Rating Scale test was unchanged. At the Unified Dyskinesia Rating Scale test, the patient was still classified for mild dyskinesia. At the Hospital Anxiety and Depression Scale (HADS) test, the patient has decreased his result by 2 points, showing a reduction in her depression and anxiety. At the Parkinson's Disease Fatigue Scale test, the patient obtained 63 points, presenting a reduction in her fatigability. The patient

obtained 12 points at the Epworth Sleepiness Scale (ESS) test, now being classified for mild excessive daytime sleepiness. The quality of her sleep has been increased after the six months, having a result of 62 points at the the Parkinson's Sleep Scale test.

The sixth patient, C.C., male, 62 years, diagnosed with Parkinson's disease for 16 years, had loss of his balance most time for the day, but without falls, along with slowness of the movements. The patient was still fully independent in his daily living activities, such as dressing, hygiene, and eating. The patient presented a tremor of his all limbs, being more emphasized on the left side. Also, the patient had rigidity and bradykinesia. The non-motor symptoms of the patient were the following: difficulties in cognition, problem solving and concentration; sleep problems with daytime tiredness; apathy and depression. Results before the physical exercises at home: At the part III of UPDRS Scale test the patient obtained 33 points. The patient was in stage III on Hoehn and Yahr scale. The patient obtained 13 points at the gait mobility of Lindop Parkinson's Assessment Scale and 12 points at the bed mobility of Lindop Parkinson's Assessment Scale. At the Modified Bradykinesia Rating Scale test, the patient obtained the score of 2, having a moderate, reduction in amplitude visible early in performance but continuing to maintain 50% of amplitude through most of the tasks. At the Unified Dyskinesia Rating Scale test, the patient was classified for mild dyskinesia. At the Hospital Anxiety and Depression Scale (HADS) test, the patient obtained 18 points, being a candidate for moderate depression and anxiety. At the Parkinson's Disease Fatigue Scale test, the patient obtained 65 points, classifying him for moderate fatigue. At the Epworth Sleepiness Scale (ESS) test, the patient obtained 13 points, classifying him for moderate-excessive daytime sleepiness. The patient obtained 65 points at the Parkinson's Sleep Scale test. After the six months of physical training by practicing exercises at home, the patient obtained the following results: at the part III of UPDRS Scale test, his result was decreased by 2 points. The patient remained in stage III of Hoehn and Yahr scale. Also, the patient obtained 14 points at the gait mobility of Lindop Parkinson's Assessment Scale test and 13 points at the bed mobility of Lindop Parkinson's Assessment Scale test. His result on the Modified Bradykinesia Rating Scale test was unchanged. At the Unified Dyskinesia Rating Scale test, the patient was still classified for mild dyskinesia. At the Hospital Anxiety and Depression Scale (HADS) test, the patient has decreased his result by 3 points, showing a reduction in his depression and anxiety. At the Parkinson's Disease Fatigue Scale test, the patient obtained 61 points, presenting a reduction in his fatigability. The patient obtained 11 points at the Epworth Sleepiness Scale (ESS) test, now being classified for mild excessive daytime sleepiness. The quality of his sleep has been increased after the six months, having a result of 60 points at the the Parkinson's Sleep Scale test.

Discussion

Usually, the Parkinson's disease patients complain of difficulties concerning walking, mobility, posture and balance, as the disease progresses. These symptoms can be ameliorated by physical exercise. The risk of falling may also decrease.

The practice of exercises can improve movement, thinking and memory. Also, physical exercises can have a positive impact on the physical appearance, mood and social interactions. The physical benefits are: increased strength in the limbs, increased strength in the muscles of the trunk and increased flexibility of the muscles.

The brain can form and reorganize connections due to the process known as neuroplasticity. There is some evidence that exercise can improve neuroplasticity. Exercise can help improve attention, thinking and memory. Physical activities can stimulate brain areas related to learning. These factors can improve the mental state by decreasing depression and anxiety and therefore the quality of life of the patients. In conclusion, in both the drug treatment and the recovery of Parkinson's disease, the main purpose is to ensure a quality of life of the patient as close to the normal one.

Conclusion

In particular, improvements in patient's posture, gait, speech and UPDRS items were found, which enhances the idea that home exercises may influence axial symptoms, in particular, in Parkinson's disease.

The main conclusion of this study is the proposal of a home-based protocol of physical exercises with the objective of the enhancement or even the replacement exercise classes farther of the patient's home environment. The study might have a more beneficial home health-care trajectory for resolutions in examining Parkinson's disease patients and at the same time decreasing their health expenses.

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