

Aerobics Exercise in Two Post Parkinson's Disease Care: Effective Treatment among Group Exercise Versus Individual Supervised Exercise

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Abstract

Objective: To compare group supervised exercise (GE) and individual exercise (IE) in a hospital setting, in terms of improvement in quality of life, gait and balance and social interaction.

Study Design and Setting: This was a prospective cohort study in Jos (Plateau State).

Participants: Sixty seven patients completed the outcome data.

Measures: Daily activities were measured by the bartel index, tinetti scale (balance and gait), and short form SF-36 health survey to compare quality of life.

Results: No statically significant differences were found between the two groups regarding the symptoms of PD. After exercise supervised by physiotherapist both group showed significant improvement from each measurement. These improvements were better in individual than group supervised exercise patient with all functionality scales with a smaller margin.

Conclusion: Individual supervised exercise is more effective than group supervised exercise in term of improvement in quality of life, activities of daily living, gait and balance and social interaction.

Keywords: Balance, Motor and non-motor symptoms, Parkinson's disease, Therapeutic exercise

Introduction

Parkinson disease (PD) is a progressive chronic nervous system disease resulted from decrease in amount of dopamine production in substantia nigra. Parkinson's disease is the second most common neurodegenerative disorders. PD commoner age is 55 years above, the risk related more with increase in age. Symptoms PD characterized primarily by rigidity, tremor, bradykinesia, speech changes, writing changes and postural instability.

Literatures suggested that therapeutic exercise improve quality of life in Parkinson disease. Available studies indicate that therapeutic protocol has to focus on: cueing strategies, balance, cognitive movement strategies and improved physical capacity. Motor training exercise for PD patients have been designed and evaluated but only specific training strategies tailored for each patient, may produce improvements in gait speed and stride length, decrease motor

and balance symptoms and improve quality of life. Furthermore, therapeutic exercise such as balance and coordination training may improve muscle trophism and postural balance and strength. Aerobics exercise such walking, dancing, juggling and biking has therapeutic effect in patient improvement. It seems reasonable to state that tailored therapeutic exercise is the physical activities that is structure, planned and repetitive and condition for any part of the body which is a valid tool to be included in the therapeutic program of PD patients, considering that this therapeutic exercise may alleviate the symptoms as well as the overall physical incapacity, reduce the risk of falls and injuries, and ultimately improve quality of life and social interaction.

The aim of this study was to compare group exercise (GE) and individual outpatient hospital supervised exercise (IE) in terms of improvement of the functional abilities and quality of life who

have suffered Parkinson disease. We hypothesized that individual exercise supervised by physiotherapist is more effective than group outpatient supervised exercise to improve quality of life.

Material and Methods

Design

This study was based on a prospective cohort study in the department of physiotherapy Rosad Parkinson disease research, initiative and foundation. Jos in the period of November 2017 to October 2018. This Rosad is nongovernmental organization specialized on Parkinson disease research and care. They care and research for the management of Parkinson disease.

Subject of Study

Patients were consecutively recruited by the neurologist in the neurology unit at Jos university teaching hospital, Plateau State specialist hospital Jos for Rosad Parkinson after diagnosed with PD. The subject used is stable to carry out the exercise. The number of subject required for this study was calculated across a sample of patient who performs the group and individual exercise from Nov. 2017 to October 2018, included in a previous study in patient with similar characteristics, using epidata software version 3.1, for comparison of independent averages. A standard deviation was obtained from initial and final bartel score, 43.788 recorded for the first group (IE)) and 32.993 for the second group (GE); the mean detected was 11.710; considering for calculation a ratio among samples of 1, a confidence level of 95% and a power of 80%. The result showed a minimum sample size of 21 patients; considering a possible loss of 10%, the number of subject to recruit would be 20 patient group category (GE) and 20 individual patient category (IE). The aerobic exercises of 45mins performed thrice in a week.

Inclusion and Exclusion

Inclusion criteria were patients who were referred for physiotherapy from Jos university teaching Hospital and Plateau State specialist Hospital Jos. Generally, the requirements for referral to improve the patient wellbeing. Stable patient for exercise are referred by the neurologist.

Exclusion criteria for both exercise were: the patient could travel by himself, or was not considered in a dependent state in terms of activities of daily (ADL) Barthel index score of 91 or better); no exercise or physiotherapy acceptability by the patient has been performed at a different institution, lack of cooperation from the patient or caregivers; severe cognitive impairment leading to failure to understand and act upon instructions; inability to speak and understand English language; patient with terminal disease.

The treatment was selected by a rehabilitation physician basis of the need for assistance in balance and gait, quality of life and social interaction. The characteristics of patient and availability of social and family support, in accordance with the rehabilitation guideline of primary healthcare Nigeria.

The total sample was composed of 67 patients; 34 of which constituted the group exercise and 33 of the individual group in the Physiotherapy department at Rosad Neurodegenerative disease Research institute. The enrolment for the study is described and all patients provided written informed consent before treatment in accordance

with the Jos university teaching hospital declaration. This study was approved by the scientific ethics committee of the Jos university teaching hospital and Plateau state specialist Hospital research commission and adhered to the guidelines of the international of medical journal editors.

Flow Chart

Outcome Measures

Baseline and pre-mobid characteristic were recorded at the time of enrollment. To determine the impact of group exercise or individual exercise on functional independence.

Achieved significant difference, various validated scales were used: the Barthel Index to measure ADLs, the Canadian Neurological Scale to assess mental state, and the Tinetti Scale to assess balance and gait. The SF-36 was used to compare the quality of life of the two groups of patients.

All subjects were assessed by an external physiotherapist who did not participate in the supervision of the exercise within the first week after the diagnosed of Parkinson disease and after the end of training rehabilitation. Other secondary variables analyzed were the rehabilitative goals, the number of sessions, and the number of hospital readmissions.

Therapeutic Exercise Process

Many literatures show that therapeutic exercise must start as soon as a diagnosis is established; a medical test needs to be carried out to confirm patient is eligible for exercise before recruited to this program. In the brain, the deficit caused by limited dopamine is usually fesonating (tropism), and enabling techniques are used, such as the dancing-play therapy that counteracts involuntary movement by inhibiting postures obtained through dancing and walking in the opposite direction to the one imposed by tropism. The types of exercise performed are the same all through for the two groups. The registration and information form developed in the unit contains the main treatment goals for all phases, as classified by study. Generally, normalization of postural tone and selective mobility training will be applied at first mainly on the trunk and lower limbs, in preparation for gait. Subsequently, the focus is on the integration of the upper limbs in ADL.

Patients in the group category were supervised by a physiotherapist each of whom had prior experience in PD treatment (these professionals didn't know about patients' participation in the study). For each patient, home training was based upon both the individual, particular needs and the rehabilitation goals. Patients in the hospital group were treated according to the standard rehabilitation procedure in the neurodegenerative disease Unit by physiotherapists (who didn't know about the study) in individual training sessions that focused on the patient's problems. This type of treatment typically ends when the rehabilitation doctor believes that there are no new functional objectives to reach, or when a patient no longer wants to continue.

Data Analysis

The results were analyzed using Statistical Package for Social Science (SPSS) version 21.0. Descriptive statistics summarize the socio-demographic and clinical characteristics of participants,

and display them as percentages. T-tests were used to calculate the changes in physical, mental and social health outcomes that occurred after the diagnosed of PD (within-group comparisons of pre- and post-intervention scores, T-test for related samples), and between the two groups (between-group comparisons of change scores in all outcome measures, T-test for independent samples). Parametric statistics were used for the continuous variables extracted by functional tests. A p value of < 0.05 was considered statistically significant.

Results

Our analysis of the initial measurement data showed no statistically significant differences between the two groups in relation to any of the variables, except age.

VARIABLES	IE GROUP	GE GROUP	T-CHIS-QUIRE	P
ILICIT DRUGS	43.24±0.56	34. ±0.98	1.253	0.212
OBESITY	21.57±0.34	21.12±0.56	1.253	0.212
AGE	23.57±0.31	27.12±0.56	1.253	0.212
GENDER	27.17±0.24	29.24±0.14	1.253	0.212
ALCOHOL	41.57±0.17	42.32±0.56	1.253	0.212

P represents the different between IE and GE group by comparing independent sample chi-square for empirical samples. Standard deviation percentage.

	IE GROUP		Pre & Post test		GE GROUP		Pre & Post test	
	Pre & Post test 1st Assessment		2nd Assessment		Pre & Post test 1st Assessment		2nd Assessment	
Bartel index	60.14±0.26	63.24±0.56	54.24±0.56	59.18±0.71	43.24±0.56	48.24±0.56	42.24±0.18	46.24±0.46
Canadian Scale	53.21±0.34	63.24±0.56	23.12±0.34	57.24±0.76	33.24±0.52	46.24±0.56	43.24±0.46	43.24±0.24
Gait Tinetti	44.26±0.17	53.24±0.56	30.34±0.77	61.24±0.66	43.24±0.52	43.24±0.16	43.24±0.72	43.24±0.44
Balance Tinetti	53.45±0.24	53.11±0.21	53.34±0.45	58.24±0.86	44.14±0.18	42.18±0.18	46.46±0.16	43.24±0.42

Inter-group analysis was used to compare improvement in the two groups and the results. Patients in the IE group achieved better scores on the Barthel Index, Canadian Scale, and Tinetti Scale, and had greater improvements from baseline scores on all functionality scales than the GE group. Hence, the results demonstrated that the IE patients were more efficient and more functional than the patients in the GE group after intervention.

Test for Independent Samples

Descriptive statistics and significance of treatment effects between groups.

Comparison

Frequency of exercise per week: 40.3% of patients were treated two times per week, and the remaining patients were treated 3 times per week. Thus, no statistically significant differences in treatment frequency were found between the group and individual supervised exercise ($t = 1.253$; $p = 0.212$).

The treatment goals focused on minimization of the complication of the PD, recovery of the patient's previous functional capacity, sequelae prevention, and equipping patients with strategies to adapt to their condition, as well as to their immediate environment. We have summarized the functional goals established by the rehabilitation professionals. According to frequency (percentage of times each professional pointed to it as a goal of their treatment in each group). There were no statistically significant differences between treatment groups, except in the integration of the upper limbs in ADL and psychological stimulation; both had higher percentages in the hospital group.

A Functional Objectives for each group and comparison between them.

Overall, the results of the questionnaires used in this research show that at the beginning of the study, both groups of patients showed significant ADL dependence, neurological impairment at the levels of consciousness, orientation and language, as well as altered balance and gait. Both groups showed statistically significant improvements from baseline in each of the measures post-intervention.

Statistically significant differences were found between both groups in terms of the number of physiotherapy sessions given. The IE patients received an average of 22 sessions, in comparison to an average of 24 sessions in the GE group ($t = 4.21$; $p < 0.001$). Overall, PD patients treated via IE received fewer treatment sessions than those GE group.

The analysis of perceived quality of life, measured by SF-36 in both groups, is presented. Patients from both groups reported similarly as to physical activities, general health, social functioning, and mental health.

Dimensions of SF-36 Health Survey in RITH and Hospital groups

Variables	IE GROUP Pre & Post test 1st Assessment		Pre & Post test 2nd Assessment		GE GROUP Pre & Post test 1st Assessment		Pre & Post test 2nd Assessment		T-S
General health	21.19±0.44	36.24±0.34	38.57±0.34	56.34±0.46	31.17±0.33	44.57±0.34	21.57±0.56	61.57±0.64	0.001
Physical activities	22.57±0.23	31.57±0.28	32.34±0.34	46.57±0.68	34.45±0.44	41.57±0.22	21.57±0.32	41.57±0.54	
Social functioning	26.57±0.46	34.57±0.46	21.57±0.34	21.57±0.14	42.27±0.21	34.57±0.34	21.57±0.26	48.57±0.34	
Mental health	28.57±0.42	34.17±0.22	21.57±0.34	42.57±0.28	44.57±0.34	48.57±0.34	62.12±0.14	51.24±0.44	

Discussion

Despite a lower average of number of aerobic sessions, patients receiving treatment at individual form of exercises had better recovery and attained the same level of quality of life as the patients receiving group supervised exercises. In addition, IE patients achieved higher scores on functionality scales than patients in the individual group, although it is important to note that differences between the two groups were established in the initial assessments. For example, the patients in IE group, shows more zeal through personal encouragement from the therapist while GE group shows less interest after few are try to step out of the exercise.

Recent studies have reached the conclusion that early individual supervised aerobic programs after a PD provided significantly better results in terms of physical function, increased quality of life, and reduced depression. One clinical trial compared the changes in perceived health after 5 years of disease between patients who received individual supervised aerobics performed excellently and they concluded that the long-term outcome is more favorable. Our research demonstrates a positive outcome in patients of both groups in all evaluated areas: functionality, neurological scale, balance, and gait. Therefore, both services seem to be effective forms of post-PD aerobics exercises.

Conclusions

This study observed a significant improvement in patients attending aerobics exercises, which was measured by different scales that measured functionality, balance, and gait. The data showed that IE group patients had better results with respect to recovery and had fewer sessions when compared with the GE group patients. Quality of life was severely impaired similarly in both groups, as PD can disable if not properly managed; however, the degree of dependence can be minimized with an early, proper aerobics exercises [1-40].

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