

Motivation of elderly with Parkinson's disease submitted to functional training, aerobic exercise and exergame

Motivação de idosos com doença de Parkinson submetidos ao treino funcional, exercício aeróbico e exergame

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ABSTRACT

It is recommended that patients with Parkinson's disease (PD) perform physical exercise throughout their lives. Exercise should slow disease progression and motivate the patient. **Objective:** Verify and compare the motivation of elderly with PD submitted to functional training, stationary bicycle exercise and exergame. **Method:** A randomized clinical trial was developed at a referral center. Group 1 (G1) performed functional training, group 2 (G2) trained with stationary bicycle and group 3 (G3) played on Xbox 360 with Kinect sensor. At the end of training, an interview was conducted by a single non-blind investigator to evaluate patient motivation about therapeutic exercise programs they were submitted to. For each question there were four answers options: I was not motivated, I was not very motivated, I was motivated and I was very motivated. The variables were summarized in median and interquartile range and in absolute and relative frequencies. The Pearson Chi-square test was used for statistical inference. The level of significance was 5% ($p < 0.05$). Fifty-three older people with PD have participated. **Results:** Many participants have reported that exercise (G1: 72%, G2: 53%, G3: 44%) and the physiotherapist (G1: 83%, G2: 76%, G3: 94%) were very motivating. Only two participants of G2 rated exercise as not very motivating. However, no significant difference was found between the three groups. **Conclusion:** Older individuals with PD considered functional training, bicycle exercise and exergame as motivating modalities of physical exercise.

Keywords: Parkinson Disease, Physical Therapy Modalities, Exercise, Motivation, Aged

RESUMO

Recomenda-se que pacientes com doença de Parkinson (DP) realizem exercícios físicos durante toda a vida. O exercício deve retardar a progressão da doença e motivar o paciente. **Objetivo:** Verificar e comparar a motivação de idosos com DP submetidos ao treinamento funcional, exercício em bicicleta estacionária e com o exergame. **Método:** Ensaio clínico randomizado foi desenvolvido em um centro de referência. O grupo 1 (G1) foi formado por participantes que realizaram treinamento funcional, o grupo 2 (G2) foi tratado em bicicleta estacionária e o grupo 3 (G3) foi submetido ao exergame Xbox 360 com sensor Kinect. Ao final dos treinamentos, foi realizada uma entrevista para avaliar a motivação dos participantes em relação às intervenções as quais foram submetidos. Para cada pergunta existiam quatro opções de respostas: não estava motivado, estava pouco motivado, estava motivado e estava muito motivado. As variáveis foram sumarizadas em mediana e intervalo interquartil e em frequências absolutas e relativas. O teste de Chi-quadrado de Pearson foi usado na inferência estatística. O nível de significância adotado foi de 5% ($p < 0,05$). Participaram do estudo 53 idosos com DP. **Resultados:** Muitos participantes relataram que o exercício (G1: 72%, G2: 53%, G3: 44%) e o fisioterapeuta (G1: 83%, G2: 76%, G3: 94%) foram muito motivadores. Apenas dois participantes do G2 classificaram o exercício como não motivador. No entanto, nenhuma diferença significativa foi encontrada entre os três grupos. **Conclusão:** Os indivíduos idosos com DP consideraram o treinamento funcional, o exercício em bicicleta e o exergame como modalidades motivadoras de treinamento.

Palavras-chave: Doença de Parkinson, Modalidades de Fisioterapia, Exercício, Motivação, Idoso

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INTRODUCTION

Parkinson's disease (PD) is a chronic, progressive, neurodegenerative and idiopathic disorder of central nervous system, characterized by alterations in dopamine synthesis.¹ It is the second most prevalent neurodegenerative disease in the world, with prevalence around 1.5 to 2% of elderly population.² PD is characterized by progressive motor disorders, which include balance and postural problems, muscular rigidity, bradykinesia, resting tremor and gait disturbances.³

These motor clinical manifestations cause functional disabilities and psychic manifestations that promote non-motor alterations and can also negatively influence patient quality of life.⁴ These non-motor complications include psychosis, cognitive disorders and depression.⁴

Recently, studies have shown the efficacy of therapeutic exercise programs, associated with drug intervention, as a treatment of patients with PD.⁵ Once physiotherapeutic program is finished, improvements of clinical manifestations and kinetic-functional aspects can be perceived.⁵ Physical exercise interventions show improvements in several evaluation measures, which include physical, functional and quality of life aspects.^{6,7}

Elderly with PD need to practice physical exercise throughout life to maintain their health and reduce disease severity. The European guideline of physiotherapy for PD recommends daily increasing of physical activity level and practicing a physical training program during 150 minutes per week.⁸

Thus, having these patients motivated when performing physical exercise programs is an important challenge to be considered in physiotherapeutic action. Alternative exercise's modalities for patients with PD as dance, tai chi, boxing and exergame training should be more motivate than traditional exercises.

The motivation concept can be explain by Expectancy-value theories.^{9,10} These theories identify two key factors: the degree to which individuals believe they will be successful if they try (expectancy of success), and the degree to which they perceive that there is a personal importance, value or intrinsic interest in doing the task (task value).

In the literature, there are few scientific studies that have investigated whether patients with PD are motivated during exercise programs used in their neurorehabilitation process.

OBJECTIVE

The aim of this study was to compare the motivation of elderly with PD when performing functional training, bicycle exercise and exergame training.

METHOD

It is a cross-sectional observational study, part of a randomized clinical trial, carried out at a public reference outpatient clinic for the elderly. Data were collected in the period between June/2015 and March/2017. The study was carried out in accordance with the Declaration of Helsinki and approved by the Human Research Ethics Committee (ref nº. 1.016.971). All participants provided voluntary written informed consent.

Elderly (≥ 60 years-old) with idiopathic PD according to the London Brain Bank Criteria¹¹ participated in the study. All participants complied with the inclusion and exclusion criteria. The inclusion criteria were: knowing how to define motivation, regular use of medication for PD, modified Hoehn and Yahr stages 2, 2.5 or 3¹² (the interventions were developed for patients with bilateral disease involvement without severe disability) without walking devices. The volunteers defined motivation, and a researcher evaluated their answers based on Expectancy-value theories.

The exclusion criteria were: visual or hearing impairment; parkinsonian syndromes other than PD; bone, joint or muscle diseases

that limit the practice of physical activity; chronic uncontrolled diseases (hypertension, diabetes mellitus, chronic pain); unstable cardiovascular disease (acute heart failure, recent myocardial infarction, unstable angina and arrhythmias uncontrolled); current alcohol and other toxic substance use; contraindications for performing physical exercise according to the American College of Sport Medicine;¹³ practicing any physical exercise program in the last 6 months or participating in regular resistance training in the previous 12 months.

Fifty-four participants, 30 (55.6%) males and 24 (44.4%) females, 69 (± 5) years old, 66.4 (± 13.0) kilograms, 1.60 (± 0.08) meters height and 6 (± 4) years of illness duration were randomized into three intervention groups. An independent physiotherapist performed the method of sequence generation using True Random Number Service (www.random.org), a computerized random number generator to generate a randomized sequence of three different numbers.

Each number has been saved individually in different sealed red opaque envelopes. Another researcher invited the volunteers by phone for a first individual evaluation to verify if they complied with the inclusion and exclusion criteria. After each subject was admitted to the study, each envelope was opened sequentially, which determined the group allocation.

Eighteen patients (6 females and 12 males) participated in Group 1 (G1), 17 patients (9 females and 8 males) participated in Group 2 (G2) and 18 patients (9 females and 9 males) participated in Group 3 (G3). Participants of G1 were submitted to functional training, G2 performed bicycle exercise and G3 was trained with the exergame Xbox 360 with Kinect sensor.

The sessions performed in all groups lasted 8 weeks with a frequency of three 50-minutes sessions per week, based on similar protocols from other groups.^{6,8} Each session consisted in 10 minutes of stretching, 5 minutes of calisthenics exercises, 30 minutes of intervention and 5 minutes of breathing exercises to slow down. All interventions have achieved individual perception of tiring exercise, that is, 15 points of Borg scale.¹⁴ Participants who missed more than once a week or more than 4 absences during the 8-weeks of training for any reason were considered lost to follow up and not analyzed further.

Functional training performed by G1 was based on Canning et al.¹⁵ and consisted of 10 activities lasting 3 minutes each one. The 10 exercises were: gait with obstacles, going up and down stairs and ramp, sitting and standing exercise, side gears, balance exercise in proprioceptive platform, activities with balls, step exercises, foot tip exercises, graded reaching activities and gait training.

The G2 participants were conducted with aerobic training on a stationary bicycle. In the first week, training was titrated to 50% of maximum heart rate, increasing progressively to 75% in the eighth week. In the first week, we used 50% of maximum heart rate, in the second and third week 55%, in the fourth and fifth weeks 65%, in the sixth and seventh weeks 70% and in the eighth week 75%. The Karvonen formula¹⁶ was used to determine heart rate training goals for each session.

Patients of G3 trained using the exergame Xbox 360 with Kinect sensor. The Kinect Adventures games were used. These exergames use full body motion to allow the player to engage in a variety of mini-games, all of which feature jump-in, jump-out multiplayer play. Each mini-game lasts about three minutes. To complete 30 minutes of training, the same one or two mini-games were repeated in different levels of intensity in each session. All treatments were carried out under the supervision of a physiotherapist who stimulated the patients to correct posture and promote the best exercise performance. The same physiotherapist conducted G1 and G2 and another one conducted G3.

The evaluation was performed by a single non-blinded researcher. Participant's motivation during physical exercise program, perception of training impact on their health and their satisfaction about the exercise training was evaluated by an interview composed of 7

questions (Chart 1). There is not a specific instrument to evaluate individual's motivation about physical exercise programs. Thus, questions were based on Richmond Test, an instrument used to evaluate the motivation of smokers seeking treatment.¹⁷

Chart 1. Questions to evaluate the patient's motivation about exercise trainings

Question	Answers
1. Were you motivated before you started treatment?	I was not motivated; I was not very motivated; I was motivated; I was very motivated.
2. Were you motivated after you finished treatment?	I was not motivated; I was not very motivated; I was motivated; I was very motivated.
3. Did exercise motivate you?	Motivated a little; Motivated; Motivated a lot.
4. Did therapist motivate you?	Motivated a little; Motivated; Motivated a lot.
5. What do you think about session's number of interventions?	They were insufficient; They were sufficient
6. How did you feel after training?	I felt worst; I did not feel anything; I felt better; I felt much better.
7. Did you feel motivated to continue exercising after completing the workout?	No; Yes, not very motivated; Yes, motivated, Yes, very motivated.

A descriptive statistical analysis was carried out. Quantitative variables were presented in median and interquartile range and qualitative variables in absolute and relative frequencies. To perform statistical inference was used Fisher Exact test. The level of significance was 5% (p <0.05). The statistical program Statistical Package for the Social Sciences (SPSS version 22) has been used.

RESULTS

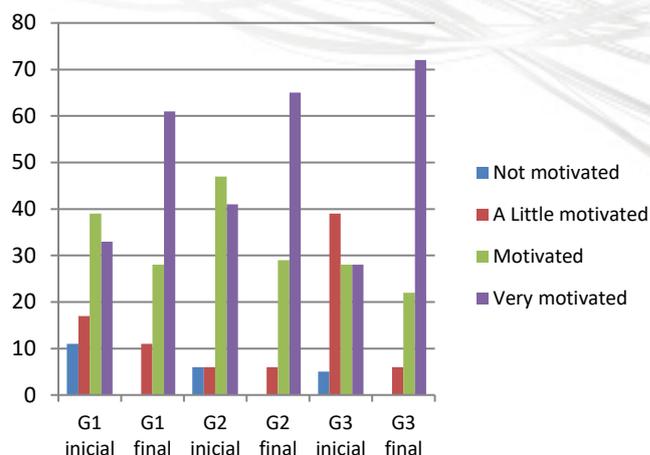
Fifty-four elderly people with PD were selected to participate in the study. One voluntary did not participate, because did not comply with inclusion criteria. No patient reported any adverse effects during and after the training. There were no significant differences between groups for sociodemographic and clinical participant's characteristics (Table 1).

Table 1. Sociodemographic and clinical data of elderly people with Parkinson's disease

Variable	G1 (n=18) n (%) Median (IR)	G2 (n=17) n (%) Median (IR)	G3 (n=18) n (%) Median (IR)	p
Sex				
Female	6 (33)	9 (53)	9 (50)	0,358
Age (years)	69 (66-75)	69 (63-73)	67 (66-68)	0,226
UPDRS	26,5 (20,0-38,0)	32,0 (21,0-40,5)	32,0 (17,0-44,0)	0,87
Schooling (years)	8,5 (5,0-11,0)	11,0 (6,5-11,0)	9,0 (4,0-11,0)	0,502
Illness time (years)	5,0 (2,0-7,0)	6,0 (4,0-7,0)	4,5 (4,0-7,5)	0,519
MMSE	27,0 (24,0-28,0)	27,0 (24,5-29,5)	28,0 (24,0-28,5)	0,606
Hoehn & Yahr	2,5 (2,5-3,0)	2,5 (2,3-3,0)	2,5 (2,0-2,5)	0,161

MMSE: mini-mental state examination; IR: interquartile range; UPDRS: Unified Parkinson's Disease Rating Scale; G1: Functional Group; G2: Bicycle Group; G3: Exergame Group

Figure 1 shows an increase of highly motivated category comparing initial motivation and after training motivation.



Note: G1: Functional Group; G2: Bicycle Group; G3: Exergame Group

Figure 1. Motivation of elderly with Parkinson's disease before and after treatment.

Most participants reported exercises and therapist as very motivating (Table 2). Only 1 participant in Bicycle Group reported exercise as not very motivating. However, there were no significant differences between groups.

Table 2. Motivation and participant's perception about exercise and therapist action

Variable	G1 (n=18) n (%)	G2 (n=17) n (%)	G3 (n=18) n (%)	p
Did exercise motivate you?				
Motivated a lot	13 (72)	9 (53)	8 (44)	0,136
Motivated	5 (28)	6 (35)	10 (56)	
Motivated a little	-	2 (12)	-	
Did therapist motivate you?				
Motivated a lot	15 (83)	13 (76)	17 (94)	0,513
Motivated	3 (17)	3 (18)	1 (6)	
Motivated a little	-	1 (6)	-	

G1: Functional Group; G2: Bicycle Group; G3: Exergame Group

Most of the participants agreed that the sessions number of interventions were sufficient (G1=67%, G2=88% and G3=78%). Thirty three percent participants of G1 reported feel better and 39% much better after training. Among the G2 participants, 35% reported feel better and 35% much better and in G3, 50% reported feel better and 33% much better. Only one participant of G2 reported did not feel changes after treatment.

Seventy-two percent of the participants in G1 and G3 were very motivated to continue performing physical exercise after finishing the exercise program. However, G2 presented a small number of highly motivated patients to continue exercising after finished training (59%, n=10).

DISCUSSION

Functional training, bicycle exercise and exergame training motivated elderly participants in mild to moderate stage of PD during the exercise program. Any exercise modality was more motivating

than another, thus no differences were found between participant's motivation and perception of health improvements in each group. However, only bicycle group presented participants who were not very motivated with the exercise, they also reported did not feel changes after treatment and presented a small number of highly motivated patients to continue exercising after finished training.

The motivation of patients with PD is also associated with individual and external events¹⁸ and not only on physical exercise modalities. Thus, it will explain why our participants were motivated during our entire physical exercise program. However, participants from a previous study¹⁹ reported monotony when they were performing conventional treatments in physical therapy program. These authors suggested therapies with rewards, real or virtual feedback as provided by video games to improve motivation.¹⁹

Exergames are capable of provoking physiological responses necessary for improvements in the components of physical fitness (muscular strength and endurance, body composition and cardiorespiratory fitness), making it more of an instrument for individuals who need motivation to be regularly active.²⁰

Individuals with PD reported satisfaction, pleasure and comfort when performing training with the exergame Nintendo Wii.²¹ These researchers used home training with the exergame Nintendo Wii to motivate patients and facilitate participant's adherence to physiotherapeutic intervention.²¹

Pompeu et al.²² also believed that the exergame Nintendo Wii could be used as a therapeutic tool associated with physical therapy to improve patient motivation and compliance.

However, a recent systematic review has showed that no differences were found between the adherence of participants submitted to virtual reality training and other therapeutic interventions.²³ Regarding the motivation, we did not find studies that have investigated and compared the level of motivation of elderly with PD submitted to exergame training and other modalities of physical exercise.

Participating in physical exercise programs should motivate elderly patients with PD. The number of elderly with PD who have participated in the study, that reported being motivated at the end of physical exercise program, was greater comparing to the beginning of the training.

Most of our participants also reported feeling better or much better at the end of training, without significant difference between the modalities of therapeutic exercise used. This result can be explained by the effects of physical exercise in relation to cognitive and psychosocial aspects.

Nelson et al.²⁴ in their study found improvements on self-esteem, body image, mood and well-being, reduction of risk of depression, stress and anxiety as beneficial effects of a physical exercise program in elderly people with PD. They did not observe difference between the modalities of physical exercise used.²⁴

Physiotherapist participation during therapeutic exercise should be an external fact that could improve patient's motivation. In this study all physical exercise sessions were accompanied by the same physiotherapist. These professionals acted motivating and energizing the exercises while making postural corrections through proprioceptive and verbal stimuli throughout the treatment. The majority of participants felt motivated by the physiotherapist participation during all exercise sessions.

According to Friedrich et al.²⁵ the therapist-patient relationship influences on patient motivation in several levels, including the psychological. Thus, the physiotherapist should establish adequate goals to the individual, which can be reached gradually and can enhance their performance, evidencing their potentials.¹⁸ In this way, to achieve success of a therapeutic intervention, the professional must be able to motivate and the patient must be receptive and attentive to respond to the stimuli offered by him. No study has verified the motivation of patients with PD submitted to different modalities of therapeutic exercises. A similar study has evaluated the motivation of

patients with PD before start a specific exercise program. Among the aspects that most motivated patients were the expectation of delaying progression of PD (n=5.28%), medical recommendation (n=5.28%) and the belief that exercise would help to support the Parkinsonian symptoms (n=4.22%).²⁶

Neurodegenerative symptoms of PD added to aging process make elderly with this disease dependent on physical exercise practice throughout their lives. All physical exercise modalities proposed in this study motivated the participants with PD to continue practicing physical exercise after having finished the program.

The small sample size and the lack of blinding were limitations. Therefore, it is necessary to conduct controlled, randomized and blinded clinical trials with robust samples to investigate the effects of different types of physical exercise on the motivation of elderly patients with PD.

Forty percent of the interventions compared in this study was composed by similar exercises (muscle stretching, calisthenics and breathing exercises). Thus, this fact may have reduced the difference between groups. Another limitation was the retrospective data about participant's motivation before starting the training.

CONCLUSION

Functional training, bicycle exercise and exergame training were perceived as motivating therapeutic exercise modalities for elderly people with PD in the mild to moderate phase of the disease. The physiotherapist also presents an important task as a facilitator and motivator during physical exercise program.

Therefore, although there is a tendency to affirm that treatments with new technologies motivate more than conventional therapies, there are no studies that demonstrate this. It is the first study about this subject, thus it is necessary more researches involving the motivation of elderly with PD in relation to different modalities of therapeutic exercises.

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