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# Effects of proprioceptive neuromuscular facilitation on the functional independence measure in patients with Parkinson's disease

## Os efeitos da facilitação neuromuscular proprioceptiva sobre a medida de independência funcional em pacientes parkinsonianos

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**ABSTRACT**

**Background:** Parkinson's disease is classified as a chronic, degenerative disease and is characterized by a regression in the number of dopaminergic neurons in the substantia nigra region, the main clinical features of PD are: muscle rigidity and tremor at rest six cycles per second. **Objective:** To evaluate the effects of pop on the Functional Independence Measure (FIM) in patient carriers of Parkinson disease. **Method:** The above study five elderly patients with Parkinson's disease with a mean age of 82,5±10,33 years. The study was carried out applying the FIM questionnaire before and after treatment with PNF to assess cognitive and motor control levels. The patients were submitted to 10 sessions estimated time between 40 and 50 minutes. **Results:** The analysis of the functional independence of patients, although the results have been optimistic, improving patient's functional pattern not observed statistically significant difference (p >0,05). **Conclusion:** It did not get positive results when assessing the level of motor and cognitive functional independence. Although there have been reports of improvement in locomotion and sphincter control by the patients themselves.

**Keywords:** Nuclei of the base; Parkinson's disease; Proprioception, March.

**RESUMO**

**Introdução:** A doença de Parkinson (DP) é classificada como uma doença crônico-neurodegenerativa, que caracteriza-se por uma regressão progressiva no número de neurônios dopaminérgicos na região da substância negra, ascaracterísticas clínicas principais da DP são: rigidez na muscular e tremor ao repouso na frequência fixa de três a seis ciclos por segundo. **Objetivo:** O objetivo deste estudo foi avaliar os efeitos da FNP sobre aMedida De Independência Funcional (MIF) em pacientes portadores da doença de Parkinson. **Método:** Fizeram parte deste estudo cinco idosos portadores da doença de Parkinson com idade média de 82,5±10,33 anos. Realizou-se a aplicação do questionário MIF antes e após o tratamento com FNP, para avaliar os níveis de controle motor e cognitivo. Os pacientes foram submetidos a 10 sessões com tempo estimado entre 40 e 50 minutos. **Resultados:** Na análise da independência funcional dos pacientes, embora os resultados tenham sido otimistas, à melhoria do padrão funcional do paciente não se observou diferença estatística significante (p>0,05). **Conclusão:** Não se obteve resultados positivos ao avaliar o nível de independência funcional motora e cognitiva. Embora houvesse relatos de melhora na locomoção e controle esfincteriano pelos próprios pacientes.

**Palavras–chave:** Facilitação Neuromuscular Proprioceptiva; Doença de Parkinson; Medida de Independência Funcional.

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## INTRODUCTION

Described by the English physician James Parkinson, Parkinson's disease (PD) is classified as a chronic degenerativaque pathology occurs because of a generalized injury of black substance that is responsible for sending neuronal fibers that secrete dopamine directly to the caudate nucleus and the putamen, structures that are part of the basal ganglia.[1-6] These structures have an important driving force and when they have some kind of disorder, as results have motor disorders.[1-5,7] the cause of these changes are still unknown, however there are many researchers who present possible speculations about the etiology of this disease, such as: genetic factors and changes in mitochondrial activity.[2,4]

The Parkinson's disease characteristics are: muscle stiffness; involuntary tremors at rest, mainly the upper limbs, may progress to other areas of the body such as the mandible in a fixed frequency between three to six cycles per second; large levels of difficulty to start a movement (akinesia); march festination mainly caused by akinesia; postural instability, caused by compromised postural reflexes; when performing slow trunk movements and many other types of engines which symptoms include dysphagia, fatigue, and changes in speech,[1,2,7,8] these motor symptoms occur gradually and they are hardly noticeable at the beginning of the disease.[2,3]

Parkinson's disease is the second most common neurodegenerative disease in the elderly that affects men and women from the fifth decade of life, in Brazil the PD has an estimated prevalence of approximately 3.3%,[1,5,6] usually PD has as a treatment for symptoms mainly administration of drugs such as L-dopa (dihydroxyphenylalanine the levogeno isomer) and L-Deprenyl, with L-dopa is no relaxation of many of the symptoms of this disorder, it is believed that the explanation for this occurs due to drug conversion into dopamine thus causing a rebalance concentrations of dopamine in the central nervous system, although the treatment with L-Deprenyl has an inhibitory effect on monoamine oxidase is responsible for the destruction of dopamine after enzyme secreted causing a higher concentration of dopamine is released and remains in the tissue for a longer time.[2,3]

Studies have shown a growing role of physiotherapy in relation to the treatment of PD, with significant results in improving the quality of life and the elderly parkinsonian functionality. (1) Among the techniques used in the treatment of this pathology, manual therapy techniques have provided significant results . Thus, the aim of this study is to assess the functional independence levels pre and post-treatment with the PNF technique in patients with PD patients.

## METHODS

### Ethics aspects

The study was conducted in accordance with the Guidelines and Regulatory Standards for Research Involving Humans (Resolution 196/1996 of the Conselho Nacional de Saude), was submitted to the Ethics Committee on Human Research, the same being approved with the opinion No. 12641813.4. 0000.5020. All volunteers of the research, first had to sign the Informed Consent (IC) after agreement with the family.

### Inclusion Criteria

Were included in the study, male and female elderly, aged over 60 and with the defined diagnosis of PD.

### Exclusion Criteria

Individuals with mobility impairment and/or cognitive impairment.

### Procedures

After signing the informed consent of the patients underwent the evaluation neurofuncionnal physical therapy, then held up the implementation of the FIM questionnaire, which consists of a list of functional activities scored in self-care, sphincter muscle control, transfers, locomotion and media scored from 1 to 7 for quantitative indication of the level of functional independence.[9-11] Subsequently began the treatment program participants, which consisted of 10 sessions, three times a week, with an estimated time between 40 and 50 minutes. After 48 hours of the last session, patients underwent a new evaluation with the FIM. The summary of the procedures performed can be observed in the flow chart (figure 1).

### Statistical analysis

Statistical analysis was performed using the Kolmogorov-Smirnov test to verify the sample normality after the analysis we used the nonparametric Kruskal Wallis of data Dunns post hoc, as significance value data with $p < 0.05$ were accepted.

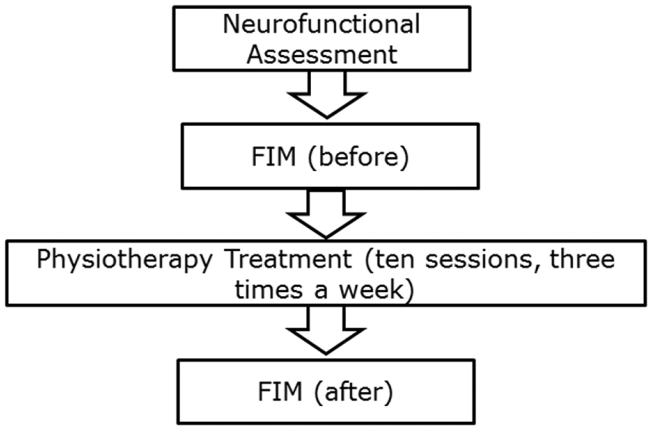


**Figure 1.** Descriptive flowchart of procedures performed in the study. Subtitle: IC: Informed consent, FIM: Functional Independence Measure, PNF: Proprioceptive neuromuscular facilitation.

## RESULTS

They took part in this research five elderly with PD diagnosis, which held regular medical follow-up, the experimental group had the following anthropometric characteristics: body mass of 65.26 ± 11.27, height of 1.56 ± 0.03 and BMI of 20.90 ± 3.16. MIF was applied before treatment and 48 hours after the last session.

Table 1 shows the level of functional independence for the motor control of the participants, the following parameters were evaluated: personal care (feeding, grooming, dressing upper, dressing lower, toilet), sphincter control (bladder, bowel), transfers (bed, chair, toilet, bath, shower), locomotion (walking, stairs). By analyzing the parameter feeding, toilet, bath and shower, toilet and stairs can observe a tendency to functional improvement of the elderly after training, however, the differences were not significant p> 0.05.

Table 2 were evaluated parameters such as: cognition (comprehension and expression), media (social interaction, problem solving, memory). The parameters problem solving, memory and understanding the result also showed a positive increase in the level of independence of the elderly, the other parameters showed little progress. This result may be given by the fact that the possible effects of the treatment are shown later, considering that the technique also consists of cognitive stimuli due series of standards and applied verbal commands.

Figure 2 demonstrates the values obtained before and after treatment, you can observe favorable changes to the FIM parameters, especially regarding the sphincter control. Although the results were optimistic, improving the patient's functional pattern not observed statistically significant difference (p> 0.05).

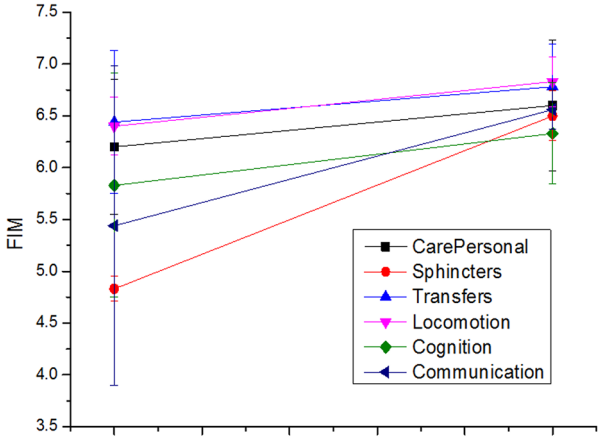


**Figure 2.** Parameters of the Functional Independence Measure (FIM) pre treatment and post treatment.

**Table 1.** Functional Independence Measure (FIM) - Motor Control.

| Parameters | Pre – PNF | Post – PNF | *P value* |
|---|---|---|---|
| Eating | 6.60±0.55 | 7.00±0 | p>0.05 |
| Grooming | 6.40±0.89 | 6.60±0.89 | p>0.05 |
| Dressing (upper) | 5.40±1.67 | 6.60±0.89 | p>0.05 |
| Dressing (lower) | 5.20±2.05 | 6.40±0.89 | p>0.05 |
| Toilet | 6.20±0.84 | 6.80±0.45 | p>0.05 |
| Bladder | 5.20±2.49 | 6.60±0.55 | p>0.05 |
| Bowel | 5.00±2.45 | 6.40±0.55 | p>0.05 |
| Bed, chair, wheelchair transfer | 5.60±1.67 | 6.80±0.45 | p>0.05 |
| Toilet transfer | 6.20±0.84 | 6.80±0.45 | p>0.05 |
| Tub, shower transfer | 6.60±0.55 | 7.00±0 | p>0.05 |
| Walking | 6.60±0.55 | 6.80±0.45 | p>0.05 |
| Stairs locomotion | 6.20±0.45 | 6.60±0.55 | p>0.05 |

**Table 2.** Functional Independence Measure (FIM) - Cognition.

| Parameters | Pre – PNF | Post – PNF | *P value* |
|---|---|---|---|
| Comprehension | 6.00±1.22 | 6.40±0.55 | *p value> 0.05* |
| Expression | 6.20±0.45 | 6.40±0.55 | p>0.05 |
| Social interaction | 6.40±0.55 | 6.60±0.55 | p>0.05 |
| Problem solving | 6.00±0.71 | 6.80±0.45 | p>0.05 |
| Memory | 3.80±0.84 | 6.60±0.55 | p>0.05 |

## DISCUSSION

PNF is a technique that has been used for reacquisition of functional ability in a variety of therapies,[13] but relating PD and PNF few studies have been carried out, which makes this study important because looking through the FIM show efficacy or not treatment with PNF in elderly patients with PD.

According to studies the PNF promotes improved fitness in mobility, muscle stretching, provides a training motor functions, and improve possible postural changes resulting from the PD.[14-16,18-19] Similar results were described in the study that linked the PNF in adolescents with hemiparesis to note the increase in muscle tone and postural corrections.[20]

Based on statistical analysis, no significant differences were observed in the analyzed aspects of FIM, however clinically significant improvements were reported in the elderly parkinsonian functionality after the sessions based on the PNF. This possible improvement was perceived by patients who reported a significant development in the bladder and bowel control, as well as in walking ability within and outside the home and activities such as bathing, using the toilet, up/down stairs and walking. This positive influence of PNF technique is related to the possible increase in flexibility and strength, given that a major feature of PD is the muscle stiffness.[1,2,7]

The evolution in the quality of functions performed in daily life can possibly be relacionadaa improved DP carrier level of flexibility after physical therapy,[8] is important to consider muscle weakness, a feature that can be observed in individuals with disease. This characteristic can be reflected in increased patient balance deficit, as though the muscles present in strong excitatory activity not necessarily the muscles will be strengthened.[1,8,17]

By observing the results of treatment with individuals can observe the perspective of improvement of motor functions, as shown in figure 2, although there was no significant difference in the treatment with PNF was noted an increase in mobility results of patients possibly presented these results due to increased muscle strength. Some studies suggest a novel therapeutic approach to force treatment in parkinsonian patients with low loads and fast movements[21] in PNF movements are not exactly fast, however, the manual contact and rhythmic movements, can cause the patient receives a sufficient amount of muscle work load to provide a gradual increase in the strength levels.

Despite improvements reported by patients, based on statistical tests, there was no significant increase in MIF values pre-treatment and post-treatment with PNF. Possibly not obtained significant results because little sample availability in the city, which limited the work. It is important to emphasize the need to develop new works that relate the effects of PNF technique with carriers of PD based on the improvement of functional independence level before and after the intervention and the use of other tools analysis engine parameters.

## CONCLUSION

This study showed that after the treatment program with ten sessions PNF, three times a week in parkinsonian individuals did not obtain positive results when evaluating the level of motor and cognitive functional independence. While there have been reports of improvement in locomotion and sphincter control by the patients themselves.

### AUTHORS CONTRIBUTION

ELC (author,cientific initiation student), IPQ (Coauthor, data collect collaborator), IPQ (Data collect collaborator), IMSB (data collect collaborator), TSM ( Co mentor), FZSA (principal mentor).

### COMPETING INTERESTS

The authors declare no conflicts of interest.

### AUTHOR DETAILS

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