

Review

The importance of a multidisciplinary approach to improve the life quality for patients with Parkinson's disease

Iustina Condurache¹, Genoveva Filip¹, Paula Ancuța¹, Marius Turnea¹, Mariana Rotariu¹, Cătălin Ionițe¹

¹ Faculty of Medical Bioengineering, "University of Medicine and Pharmacy Grigore T Popa", Iasi, Romania

Correspondence: Mariana Rotariu, rotariu29@yahoo.com

ABSTRACT: Parkinson's disease is defined as a complex degenerative neurological disease with progressive evolution, which is part of motor system of the brain disorders, being the second degenerative disease as a frequency after Alzheimer's disease. It is characterized by tremor when muscles are at rest (rest tremor), increased muscle tone (stiffness), slow voluntary movements and difficulty maintaining balance (postural instability). Occupational therapy helps Parkinson's patients improve their ability to perform daily tasks. The intervention consists in assisting patients in developing a self-care routine, taking into account the limitations of functional mobility, encouraging patients to maintain maximum function of daily activities for as long as possible, learning adaptive techniques to reduce tremor. Materials and methods. The devices used for this purpose are commercially available but they are quite expensive, which is why we wanted to make devices made of material as cheap and affordable as possible. Some of the devices can be successfully made of material that every person has in their home. We also took into account the variant of making them without the need to use complicated tools and devices that are not available to patients. Starting from these premises, we thought and made in our occupational therapy laboratory various devices designed to offer patients a variety of techniques and exercises and also a flexible work environment. On a pallet plate we fixed a series of elements such as zippers, snap button, hook-and-eye closure, systems that patients use on a regular basis. We also manufactured a device designed to help patients with household chores such as dish washing. The device is provided at one end with a washing sponge, its handle being a detergent tank. The size and shape have been adapted to the needs of patients with Parkinson's disease. Results and discussions. In order to obtain the devices, cheap materials were used at the disposal of every person eager to make them. It started with simple objects that any patient uses for personal hygiene and more. The technique of making the devices was a very simple one, from the very beginning the steps that must be followed in order to make them were clearly established. Conclusions. Using the devices made during the physiotherapy sessions, significant improvements of the life quality for patients with Parkinson's disease were observed.

Keywords: *Parkinson, Occupational therapy, Devices, ADL*

Citation: Condurache et al., The importance of a multidisciplinary approach to improve the life quality for patients with Parkinson's disease, *Balneo and PRM Research Journal* 2022, 13(1): 494.

Academic Editor(s):
Constantin Munteanu

Reviewers:
Carmen Nistor Cseppento
Gabriela Dogaru

Received: 15.02.2022
Accepted: 18.03.2022
Published: 21.03.2022

Publisher's Note: Balneo and PRM Research Journal stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2022 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. INTRODUCTION

Parkinson's disease (PD) is the second most important age-related neurodegenerative disorder in developed societies, after Alzheimer's disease, with a prevalence ranging from 41 per 100,000 in the fourth decade of life to over 1900 per 100,000 in people over 80 years of age (1). Parkinson's disease (PD) is one of most disabling disorders of the central nervous system. The motor symptoms of Parkinson's disease: shaking, rigidity, slowness of movement, postural instability and difficulty with walking and gait, are difficult to measure. When disease symptoms become more pronounced, the patient experiences difficulties with hand function and walking, and is prone to falls. Baseline motor impairment and cognitive impairment are probable predictors of more rapid motor decline and disability. An additional difficulty is the variability of the symptoms caused by adverse

effects of drugs, especially levodopa (2). ADLs are characterized as the activities we perform every day such as getting dressed, taking a shower, and cooking. The ability to perform ADL's depends on overall mobility, cognitive capability, and social support, among others and is highly associated with health-related quality of life (QOL). In PD, the ADL-level also depends on response to medication and is a dominant factor in managing daily life with PD. Fluctuations in symptoms due to complex response to medication cause pendulum between periods in which PD patients are able to move smoothly for some hours (On state) and periods with increase of motor symptoms (Off-state) (3).

Occupational therapy (OT) is an allied treatment planned to assure the maximum degree of autonomy to the patient. OT may be useful to enable patients to engage in meaningful roles and activities, adapt the living environment with all the necessary devices and precautions to decrease the risk of falls or accidents, and improve domestic life and functional mobility and maintenance of work abilities. OT therefore may give a significant contribute to the overall management of patients with PD and may have a significant impact on the quality of life of patients with PD (4).

Studies show that one occupational domain negatively affected by PD is instrumental activities of daily living. According to the Occupational Therapy Practice Framework, IADLs are complex activities that support daily life in the home and community and include caring for others, communication management, driving and community mobility, financial management, health management and maintenance, home establishment and management, meal preparation and cleanup, religious and spiritual activities, safety and emergency maintenance, and shopping. Studies have found PD-related limitations in a variety of IADLs, including driving, financial management, medication management, shopping, and household management, even very early in the disease course (5). IADL limitations in people with PD are associated with withdrawal from everyday activities and reduced quality of life. These findings highlight the necessity and importance of interventions to address IADL function among people with PD (6).

In 2019, Fraciotta M conducted a study of 482 patients with Parkinson's disease to assess whether a specific occupational therapy (OT) program is effective in improving the dexterity of fingers and hands and its impact on ADL in patients with PD. All patients underwent 1 h/day OT treatment, 5 days a week. The primary outcome measure was the O'Connor finger dexterity test; secondary outcome measures were the Minnesota dexterity test, UPDRS II, and Self-Assessment Parkinson's Disease Disability Scale (SPDDS). These measures were assessed at admission (T0) and discharge (T1). Based on the Hoehn and Yahr scale (H&Y), patients were divided into two groups: 262 subjects in H&Y stage <3 (early-stage PD patients) and 220 in H&Y stage ≥ 3 (medium-advanced stage PD patients). As expected, at baseline, all measures were worse in higher H&Y stages. After treatment, both groups experienced significant improvements in all outcomes. Significant differences between early-stage and medium-advanced stage PD patients were observed only for the changes in UPDRS II, with a better improvement in patients in H&Y stage ≥ 3 . In the end, it was found that patients with PD who underwent a rehabilitation protocol, including OT, experienced improvements in finger dexterity and hand function. Our results highlight the relevance of OT in improving autonomy and quality of life in patients with PD (7).

In 2021, Foster and colleagues conducted a review to demonstrate the effectiveness of occupational therapy interventions to improve or maintain IADL function in adults with PD. 22 studies were analyzed, and the results highlighted strong evidence for the beneficial effect of occupational therapy interventions on physical activity and handwriting levels, moderate evidence strength for IADL participation, and drug adherence, and low evidence strength for cognitive rehabilitation. . In conclusion, occupational therapy sessions can improve the management and maintenance of health, handwriting and IADL participation for people with PD, but more research is needed on cognitive rehabilitation (8-15).

Material and Methods

The devices used for this purpose are commercially available, but they are quite expensive, which is why we wanted to make devices made of materials that are as cheap and affordable as possible. Some of the devices made can be successfully made from materials that everyone has in the house. We also took into account the option of making them without the need for complicated tools and devices that are not available to patients.

Based on these premises, we designed and developed in the occupational therapy laboratory various devices designed to provide patients with a variety of techniques and exercises, as well as a flexible work environment.

Results and Discussion

We have developed devices to help patients with household chores, such as washing dishes. The devices are provided at one end with a washing sponge, the handle of which is a detergent tank. Their size and shape have been adapted to the needs of patients with Parkinson's disease.

The first is effective both for patients with early Parkinson's disease and for those with severe symptoms. Insert the patient's hand between the handle and the elastic (Fig.1.), Then press the container that will fill the sponge with dishwashing detergent several times with the other hand. The grooves on the handle, made with the soldering gun, help to hold the device as well as possible, so that the patient will not slip his hand during use.



Fig 1. Dishwasher.

The second dishwasher (Fig. 2) is commercially available, but I added a foam tube to it to make it easier to hold. Metal nuts have been inserted inside the tube to reduce the tremor by means of the weight added by them. Both devices can be reused, as dishwashing detergent can be added to each of them.



Fig 2. Dishwasher.

Other household activities include cooking, so we developed a device designed to help patients peel vegetables and fruits. The device is very simple and practical, representing a standard vegetable peeler, which can be easily found in the market, inserted in a foam tube, which has inside metal nuts fixed with a soldering gun, to give it something more weight and easier to handle.

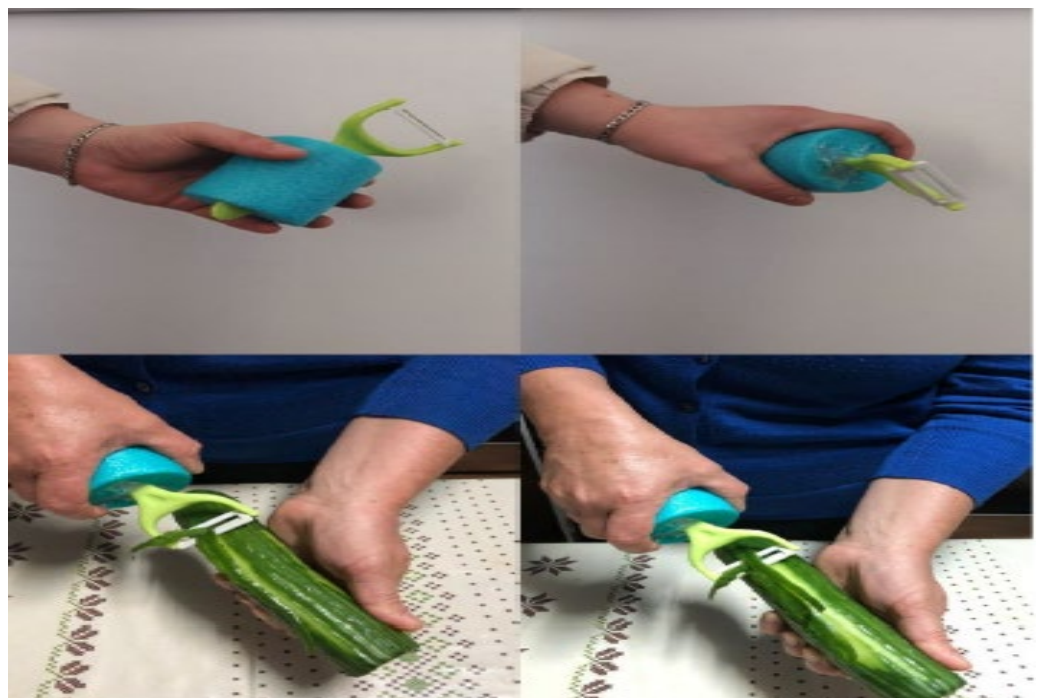


Fig 3. Device for peeling vegetables and fruits.

Personal hygiene is perhaps one of the most important daily activities that an individual must carry out for a healthier lifestyle. So, I designed a simple device, consisting of a toothbrush and a foam tube - the toothbrush was inserted into the foam tube in which I re-inserted metal nuts, fixed with a soldering gun - for to facilitate its handling by patients diagnosed with Parkinson's.



Fig 4. Toothbrush.

In order to achieve good oral hygiene, in addition to the toothbrush, we reinterpreted, through common elements, a device that facilitates the use of toothpaste by distributing an ideal amount of product, as poor grip and reduced muscle strength of Parkinson's patients restrict proper use of the toothpaste bottle. So, on a baking sheet, I evenly distributed balls of toothpaste and then sprinkled baking soda so that they would keep their shape, solidify on the outside, maintaining their effectiveness. After the paste reached its final shape, the balls were placed in an empty container of candy, found commercially. A piece of foam tube was attached around the container, using the soldering gun, inside which were metal nuts, inserted in order to facilitate grip and reduce tremor, through the stability conferred by the added weight.



Fig 5. Toothpaste.

As we get older, it becomes more and more difficult for patients to take care of household chores, so we have created a device that combines the useful with moderate physical activity. In the middle of the length of a microfiber sponge I sewed a piece of elastic fabric on either side of it, a device that can be used by patients to clean the floors, using the lower limbs and giving them the opportunity to perform a low to medium intensity physical effort, but with a fairly significant positive impact on patients' quality of life. Patients can perform both flexion / extension and abduction / adduction movements.



Fig 6. Sponge for cleaning surfaces.

As with many of the devices created, I added pieces of foam to a kitchen tong to handle the grip.



Fig 7. Kitchen tongs.

Also for cleaning the surfaces and to combine the useful with the moderate physical activity, we sewed two kitchen towels together, in order to facilitate their handling. The two cloths form a glove, with which the patient can easily clean both flat surfaces and objects, but can also be used for personal hygiene.

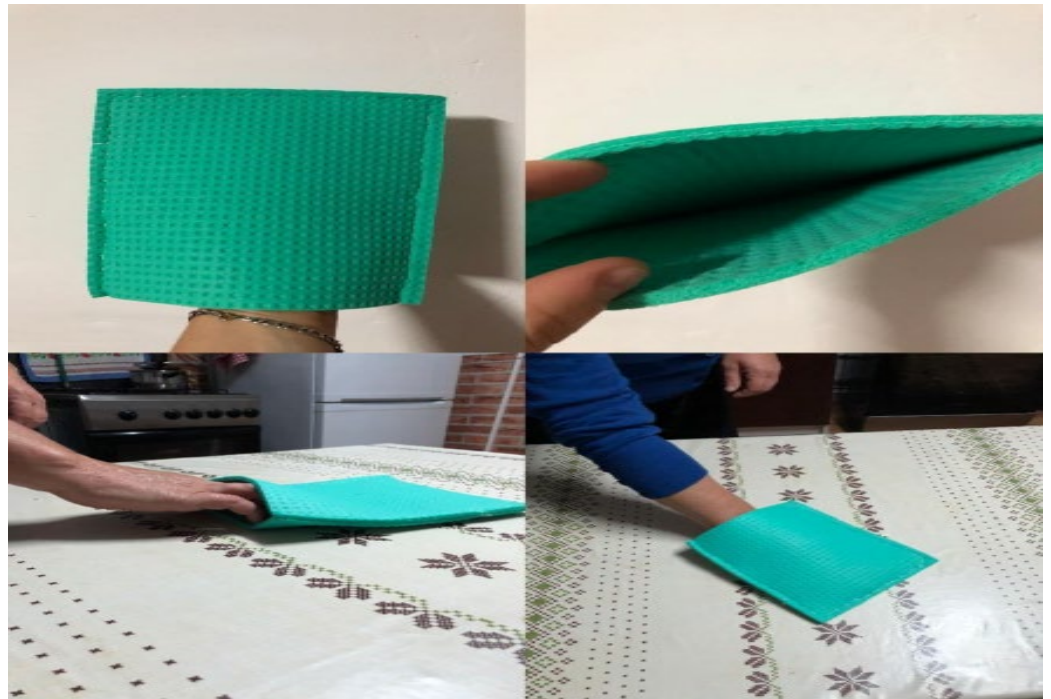


Fig 8. Double washbasin.

Body hygiene is often a challenge for patients with Parkinson's disease, which is why this device has been designed to make it easier to wash both the back and the hard-to-reach places with a minimum of effort. So, I put a bath sponge on the entire length of a shaping belt. After positioning, the belt was folded in half and sewn to keep the sponges in place. The material of the belt has a moderate abrasiveness and is suitable for the type of use for which it was created.



Fig 9. Body hygiene device.

Serving meals can be a real challenge for patients with Parkinson's disease, so we thought of a device to make this task easier for them, freeing them from the fear that they might spill the food bowl in public. At the bottom of a plastic container I glued a lid of the same material that I filled with metal nuts, to give as much stability as possible in the patient's hand. The good thing about this device is that its weight can be changed by removing a few nuts from the bottom of the device which is even completely removable.



Fig 10. Food storage device.

Conclusions

Using the devices developed in the occupational therapy laboratory, significant improvements in the quality of life of patients with Parkinson's disease were observed.

The therapeutic approach in the recovery of Parkinson's patients must be complex, must address all pathophysiological links and requires associated means of recovery: medication, physical-kinetic and hygiene-education. Following the occupational therapy program, there has been a significant increase in quality of life.

Our goals were to reduce tremor and stiffness, reduce bradykinesia, prevent neurological complications, increase and improve the quality of life by easing the movements of daily life but also by increasing patient motivation.

The movement of the body entails a good blood circulation and the functioning in normal parameters and of other organs with the maintenance of a good psychic tone. In everything that means rehabilitating the patient with Parkinson's disease, a fundamental role is played by training the owner and the family in general for care. This element is proven in daily practice where we realize that the good evolution of a patient with Parkinson's disease is closely correlated with the support he has from the family, the high mental tone of the family and the effort to integrate into active, physical and mental life.

Through the results obtained, I managed to emphasize the importance of occupational therapy in the life of the Parkinson's patient.

#All authors had equal contributions with the first author.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Cacabelos R. Parkinson's Disease: From Pathogenesis to Pharmacogenomics. *Int J Mol Sci.* 2017;18(3):551.
2. Opara J, Malecki A, Malecka E, Socha T. Motor assessment in Parkinson's disease. *Ann Agric Environ Med.* 2017;24(3):411-415.
3. Thomsen TT, Kjaer TW, Jorgensen LB et al. "Does the Response to Morning Medication Predict the ADL-Level of the Day in Parkinson's Disease?". *Parkinsons Dis.* 2020;2020:7140984.
4. Tofani M, Raneeri A, Fabbrini G et al. Efficacy of Occupational Therapy Interventions on Quality of Life in Patients with Parkinson's Disease: A Systematic Review and Meta-Analysis. *Mov Disord Clin Pract.* 2020;7(8):891-901.
5. Choi SM, Yoon GJ, Jung HJ, Kim BC. Analysis of characteristics affecting instrumental activities of daily living in Parkinson's disease patients without dementia. *Neurological Sciences* 2019; 40, 1403–1408.
6. Kudlicka A, Hindle JV, Spencer LE, Clare L. Everyday functioning of people with Parkinson's disease and impairments in executive function: A qualitative investigation. *Disability and Rehabilitation* 2019; 40, 2351–2363.
7. Fraciotta M, Maestri R, Ortelli et al. Occupational Therapy for Parkinsonian Patients: A Retrospective Study. *Parkinsons Dis.* 2019; 2019: 4561830.
8. Foster ER, Carson LG, Archer J, Hunter EG. Occupational Therapy Interventions for Instrumental Activities of Daily Living for Adults With Parkinson's Disease: A Systematic Review. *AMERICAN JOURNAL OF Occupational Therapy* 2021 75(3): 7503190030.
9. Ionițe C., Arotăriței D, Turnea M., Ilea M., Rotariu M., Applications of fitness function in Pubalgia affliction, *Balneo and PRM Research Journal.* 2021;12(1):77–81 Full Text DOI 10.12680/balneo.2021.423
10. Condurache I., Turnea M., Rotariu M., Improving functional and motor capacity through means/resources and methods specific to acvatic activities, *Balneo and PRM Research Journal.* 2021;12(1):27–30 Full Text DOI 10.12680/balneo.2021.414
11. Munteanu C., Rotariu M., Dogaru G., Ionescu E.V., Ciobanu V., Onose G., Mud therapy and rehabilitation - scientific relevance in the last six years (2015 – 2020) Systematic literature review and meta-analysis based on the PRISMA paradigm, *Balneo and PRM Research Journal.* 2021;12(1):1-15 Full Text DOI 10.12680/balneo.2021.411
12. Munteanu C., Dogaru G., Rotariu M., Onose G., Therapeutic gases used in balneotherapy and rehabilitation medicine - scientific relevance in the last ten years (2011 – 2020) - Synthetic literature review, *Balneo and PRM Research Journal.* 2021;12(2):111-122 Full Text DOI 10.12680/balneo.2021.430
13. Iordan D.A., Mocanu G.-D., Mocanu M.-D., Munteanu C., Constantin G.B., Onu I., Nechifor A., Age-Related, Sport-Specific Dysfunctions of the Shoulder and Pelvic Girdle in Athletes Table Tennis Players. Observational Study, *Balneo and PRM Research Journal.* 2021;12(4):337–344 Full Text DOI 10.12680/balneo.2021.461
14. Munteanu C., Munteanu D., Onose G., Hydrogen sulfide (H₂S) - therapeutic relevance in rehabilitation and balneotherapy Systematic literature review and meta-analysis based on the PRISMA paradigm, *Balneo and PRM Research Journal.* 2021;12(3):176-195 Full Text DOI 10.12680/balneo.2021.438
15. Munteanu C., Teoibaș-Șerban D., Iordache L., Balaurea M., Blendea C.-D., Water intake meets the Water from inside the human body – physiological, cultural, and health perspectives - Synthetic and Systematic literature review, *Balneo and PRM Research Journal.* 2021;12(3):196-209 Full Text DOI 10.12680/balneo.2021.439