

**A critical appraisal of “Comparison of strength training, aerobic training, and additional physical therapy as supplementary treatments for Parkinson’s disease: pilot study”**

**By**

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## **Abstract**

This is a critical appraisal of the article “Comparison of strength training, aerobic training, and additional physical therapy as supplementary treatments for Parkinson’s disease”. This study compared three exercise modalities and assessed their impact on patients with Parkinson’s Disease. This appraisal will include an analysis of the strengths and weaknesses of every section in the article. The analysis will be followed by a discussion on the significance of this study, and its relevance to a Physical therapists’ treatment plan for a patient with Parkinson’s disease. Through all of this, the reliability and clinical relevance of the interventions will be determined. It is crucial that Physical therapists educate themselves on the best interventions for patients using valid, reliable evidence.

## **Key words**

Parkinson’s Disease (PD), aerobic training, strength training, functional capacity, motor symptoms

## **Introduction**

Patients with Parkinson's disease make up a large sum of the patients being seen by a physical therapist for a neurological disorder. Parkinson's disease affects patients in many different ways, but most commonly the disease impairs functions related to movement. The current treatment for Parkinson's disease is most commonly approached pharmacologically and supplemented by physical/occupational therapy. It is the job of the physical therapist to use their knowledge and current research to decide on a plan of care that will be most beneficial for the patient. There is no cure for PD, but the use of pharmacology and therapy can potentially delay the effects and allow the patient to have an improved quality of life while living with Parkinson's disease. The article that is being critically appraised is comparing three different exercise modalities and their effect on patients with Parkinson's disease. It is crucial for a Physical therapist to know how different modalities will improve the patients function in order to make a custom treatment for each patient. The question presented in this critical appraisal is "Is resistance training or aerobic training a better way to manage the symptoms of Parkinson's Disease?".

## **Methods**

During my search for an article, I began by using PubMed to search for articles. I decided to use this cite because it would give me a broad collection of articles to decide from. This site allowed me to use an advanced search to narrow down my results and assure the articles were directly related to the question. The keywords I used were Parkinson's Disease, strength training, resistance training, aerobic training, and treatment. The two limits that were placed on this search were "full text" in order to exclude any articles that would not allow me to see the

entire text, and “RCT type study” to assure that the studies had both experimental and control group so that they were able to adequately compare and determine if the intervention made a change. An inclusion that I felt was very important was the study having an intervention. Having an intervention would allow for comparison and could possibly lead to an answer to the research question. The other inclusion criteria applied required all of the subjects to have a diagnosis of Parkinson’s disease. I felt this was very important to be sure that the modalities being tested were directly impacting patients with Parkinson’s disease. Before my search, I was expecting to have a very large number of articles due to how common Parkinson’s disease is, but I was surprised to find only about 68 hits before I began to review the articles.

The article that is being appraised was from the Dove press journal: Clinical interventions in aging. This article was published in 2015 by Alesandro Carvalho, Danyel Barbirato, Narahyana Araujo, Jose Vicente Martins, Jose Luiz Sá Cavalcanti, Tony Meireles Santos, Evandro S Coutinho, Jerson Laks, and Andrea C Deslandes. This study was conducted in Brazil. I chose this article because it tested both of the modalities that were included in my clinical question as well as gave specific impairments that were being measured. After assessing the validity of the paper, I determined that despite the limitations, it brought attention to an important topic regarding Parkinson’s disease and opened up the opportunity for more research regarding the subject.

## **Results**

### Summary of the study

The goal of this study was to determine which mode of training had the greatest impact on functional capacity, EEG activity, and motor symptoms. The three training groups were Strength training (ST), aerobic training (AT), and physiotherapy (P). There was twenty-two

participates in this study, randomly assigned to one of the three groups. It was a twelve-week study and the participants did their assigned exercises two times a week. In order to measure improvements/changes in the three areas, they used the UPDRS, the Senior Fitness test, and the mean frequency of the EEG. After the three-month period of doing their designated exercises, they went back in for a follow-up baseline assessment to see which group had the biggest improvements. The results showed improvement in every group, but the greatest improvements in the ST and AT groups. The EEG showed improvements from all groups relatively the same, while functional capacity and motor symptom improvement were much greater in the ST and AT groups.

#### Appraisal of the study introduction

The introduction is overall very strong. It gives a good background about the disease and thoroughly explains the motor functions that are impaired, this allows us to understand the significance of the study. Understanding these impairments are also important to note for the outcomes of the study. They explained why this study would be beneficial to patients with Parkinson's Disease, and stated which parts of their life could be improved by this study. It gives a clear purpose and hypothesis in the conclusion of the introduction, which sums it up very well and allows the audience to go into the article with a good foundation of the importance of this topic.

One weakness that I found with the introduction was the lack of specific information about the experiment being done. I would like to see more explanation about their specific study and the expected outcomes for the research. This might include giving more detail regarding the specific interventions/exercise modalities that will be performed and why these were chosen as the interventions for this study.

### Appraisal of the study methods

The experimental procedures of the study were very thorough and well done. This was a randomized control, perspective, longitudinal study. All of the participants had the same diagnosis (accounting for varying stages). The outcome measures were performed by the same evaluator to avoid variations in the way they were performed. All of the groups were managed the same and supervised to ensure the different interventions were being done properly. The methods were presented well in the article. They gave great detail about the strength training and aerobic training groups allowing these interventions to be replicated in the future. They also listed all of the outcome measures to allow for replication of these as well.

The weaknesses in the experiment included the small test population, as well as the possibility that other differing factors such as pharmacological and environmental might have impacted the results. The article presented the methods well but failed to give enough detail about the data collection procedures. They stated the measures that were used but did not go into detail about how they were conducted. This could cause an issue when trying to replicate the outcome measures in future experiments.

### Appraisal of the study results

The results section was very organized and clear. They presented the information in the same order as previously presented, making it easy to follow and understand. The results reflect the goal of the study making the results relevant to the research question. All of the information was included, even if it did not have a significant outcome. This shows that the author was not excluding any information and presenting it exactly how it was measured. All of the graphs were clear and organized well.

The results section presented all of the information, but it did not give much explanation or detail about the specific results. This made it difficult to understand and could possibly be a hinderance when trying to decipher whether or not these results will have an impact on the treatment of patients with Parkinson's disease. The tables and figures were helpful, but they were slightly unorganized making it a little less helpful when trying to understand the results. The result section was full of abbreviations that made it difficult to understand.

### Appraisal of the study discussion

The article had a very strong discussion. They summarized the results and followed them up with how they can be used to improve the treatment of patients. They did a great job comparing their results to other literature and explained whether it was agreeing or disagreeing with their findings. The authors addressed the limitations of the research and made suggestions for future studies.

The references cited in the discussion were all relevant, with exception of one article that was very out of date. Besides this, I could not identify any other weaknesses in the discussion section. They gave great detail, spoke on their limitations, gave other references, and provided suggestions for future research. They tied in the results and expanded on how this would clinically apply. I would not have any other suggestions for a discussion.

### **Discussion**

From a clinical aspect, having the answer to this question would be very beneficial. Parkinson's disease has a major impact on a person's movement pattern and motor function. The symptoms associated with Parkinson's can cause a decline in a person's ability to perform everyday tasks. Things such as posture, balance, and even walking become increasingly

challenging as the disease progresses. Because of this, it is important for a Physical Therapist to know what type of therapy will be most beneficial for their patients in order to delay or lessen the impact of these impairments. Knowing the answer to this question would allow Physical Therapists to create their plan of care accordingly and enable the patient to get a jump start on training in order to lessen the degree of impairment. This could prolong their independence and improve their daily activities. The results from this study would give observable measures to help answer my question whether resistance training or aerobic training is better for patients with Parkinson's disease.

Out of the three interventions being appraised, there was reasonable evidence to use two of the exercise modalities. The results of the study concluded that both strength training and aerobic training would have clinically significant benefits regarding motor symptoms and functional capacity for patients living with Parkinson's Disease. Using these two interventions to treat patients would benefit them by improving their physical health with the possibility of prolonging their independence. A risk that could be involved with this would be if the patient was not under proper supervision; patient safety should always come first. I would consider using these treatments for my patients in the future. Overall, the benefits for these interventions outweigh the risks. Some things that could strengthen the evidence would be to increase the number of subjects in the study. Another factor that was not taken into account during this study was the comorbidities associated with Parkinson's Disease. This is a disease that presents itself in many different ways and is commonly accompanied with other diseases. When considering the benefits, it is important to consider each patient's specific case before implementing these interventions.



I have confidence in the research validity, but I would like to see the experiment replicated on a larger subject population. I would consider using the evidence from this paper to help me plan my care for future patients. This paper does not give enough evidence by itself, but it lines up and supplements other research supporting the same subject, so together these all provide enough reliable evidence to support using these interventions with patients living with Parkinson's disease. In the future, I anticipate using these interventions with my patients in the clinic. If the patient is able to participate safely, these interventions have the ability to improve their physical health and functional capacity.

In conclusion, this critical appraisal was able to determine that the article is both valid and reliable, however, it should only be used as a supplemental piece of evidence when determining treatments for patients with Parkinson's disease. This study provided a strong foundation for further research on this topic. The question I presented was trying to determine the differences between strength and aerobic training. This study determined that the effects are relatively similar between the two modalities. In the future, I will be using this study and future related studies to help improve the quality of life of patients living with Parkinson's disease.