A critical appraisal of "Resistance versus Balance Training to Improve Postural Control in Parkinson's Disease: A Randomized Rater Blinded Controlled Study"

By

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Abstract

This paper presents a critical appraisal of a 2015 article published by the Plos One Journal in Germany about resistance- and balance-based treatments for Parkinson's patients. The clinical question that led to this appraisal is included in the introduction, which is followed by the methods employed to find the article. The work is further summarized in the results section with subsequent appraisals of the introduction, methods, results, and discussion of the article. Lastly, there is a discussion including the clinical implications of this article and its potential footing in the therapy realm.

Key words: Resistance, Parkinson's

Introduction

The purpose of this research emphasized the rehabilitation of Parkinson's patients, a population that suffers from reduced muscular strength and are consequently more injury prone. Commonly, this disease has been combatted by resistance training to improve postural control and thwart injury. I became curious by the potential of another alternative to resistance training; in case the patient could still retain the same quality of life. This led to the appraisal of maintenance/balance programs in rehabilitating PD patients. Ultimately, this curiosity guided me to the question that helped navigate this topic, "In patients with Parkinson's Disease, would a maintenance program be more effective than a hypertrophy regimen in reducing injury?"

Methods

To obtain the right articles for my question, I sought the extensive PubMed database, as I was familiar with its research capabilities. The keywords I used to initiate my search were 'resistance' and 'Parkinson's.' Though these are only a couple reference points to start I ended up with a compilation of 130 initial hits. I did not place any limits upon my search because of the initial number of articles conjured by the database. The number severely dwindled based on limitations like publication dates and trial types. From this, I ended with three credible articles after scrutinizing the list further. The main inclusion criteria I used for considering the Schlenstedt article as my sole appraisal is the way it utilizes balance training and resistance-based exercise as efficacious interventions. This packaged everything I needed into one research endeavor. The other two articles by Corcos and Youm exclusively looked at longitudinal resistance in PD patients over a two-year period and the impact of trunk resistance/stretching

exercises on fall-related factors respectively. For this, they were excluded from further critical appraisal.

The Schlenstedt article was conducted with a handful of supporting authors and was officially published by the Plos One Journal in October of 2015. The study was orchestrated abroad in Germany. To reiterate, the Schlenstedt article was the final decision to appraise because it specifically addresses my question of whether maintenance or resistance is the more indelible intervention.

Results

Summary of the study

This study was initiated to pursue postural instability and falls associated with Parkinson's Disease. Though there is research present that illustrates the benefits of exercise in combatting Parkinson's, this article's main goal was to compare two training avenues-balance and resistance. 40 patients diagnosed with PD were randomly assigned to either a resistance or balance training group (7 weeks duration) and were assessed at baseline, 8- and 12-weeks follow-up. The main outcome measure used to ascertain performance progression was the Fullerton Advanced Balance test. Of the initial 40 patients, 32 finished the study and there was no significant difference between training methods at the 8-week follow up ($p = 0.14$). However, there was significant improvement within the resistance-based cohort that was tightly linked to force output. Secondary outcome measures like gait analysis and isometric strength testing did not indicate any significant differences between the two cohorts. To reiterate, this article did not find a significant difference when comparing resistance to balance-based training at 12 weeks.

The main takeaway was an association with greater force production and improved postural stability.

Appraisal of the study introduction

The introduction perfectly explains the purpose of tackling instability in PD patients through exercise-namely via resistance training. The authors elaborate that current research looks to resistance-based training to help preclude instability in PD patients, as it will result in less injury. I believe the critical variables have been expressed enough since the overall goal to use training as a means of enhancing postural stability is stated clearly. The strength of this section is also reinforced by the sited literature. Most are recent in publication and legitimately sourced.

However, the authors only mention that balance training is enhanced through resistance training because those untrained movements will strengthen those postural muscles required for balance. I would have liked to see more background information on balance training and its bearing on the literature thus far. The other weakness is the lack of a strong hypothesis going into the experiment. The authors do not posit one exercise avenue over the other; they simply aim to test the efficacy of one against the other.

Appraisal of the study methods

The groups had similar sociodemographic information, clinical and prognostic characteristics at the baseline assessment. Inclusion criteria of the study ensured the subjects had the same diagnosis of PD, and the exclusion criteria safeguarded against any other program participation, medication, or comorbidities. There were no notable differences in the subject pool

because of these criteria. The experimenters were also blinded to the assignment, for they randomly allocated the subjects to their respective groups. This precluded any bias from the raters in their collection of data. These characteristics of the research methods lend themselves to the strength of the publication.

Some of the details I thought should be included are the combinations of exercises for the resistance group and the number of time/perturbations the balance group receives per session. The secondary outcome measures weren't clearly elaborated to the point that you could replicate them in the lab. The authors mostly express the components analyzed during each respective test, but they don't explicitly say how to conduct the test procedures. The statistical analyses included were Mann-Whitney-U-Test, Wilcoxon signed rank test, non-parametric statistical tests for demographic information, Cohen's d, Spearman's rank correlation coefficients, SPSS, and Bonferroni correction. The reporters just listed what they were applied for but did not include the purpose for their inclusion. This may make it harder for those who do not understand statistics to follow along.

Appraisal of the study results

The results are written in a clear and organized manner. The researchers present the baseline data, the blinder agreement, the significance of the 8- and 12-week follow-ups and the data (presented via charts) that was collected throughout the experiment. The progressions in the balance-based and resistance-based are evaluated as well. Another strength is the results do address the research question whenever the follow-up appointments are detailed. The researchers note significant improvement in the resistance group at the 8-week appointment and insignificant

improvement in the balance cohort. Significant details are also encapsulated in the 12-week follow-up. By including this information, the authors address the main aims of the study, which was noting the efficacy of the two training cohorts.

There are only a few weaknesses in the results that do not strengthen its presentation. The main critique is the extensive chart that encapsulates the 8-week follow-up variables. The chart is too voluminous, and readers may have difficulty tracking which value belongs to what variable. Grid lines could be used to separate the data more individually. The second is there is a lack of data presented for the 12-week follow-up. There is 8-week data and then there is the significant comparison between the two appointments. Presenting the same extensive variables for the second follow-up visit may help illustrate to the reader their importance.

Appraisal of the study discussion

The authors delve into the importance of strength in postural control. They do indicate that the higher strength levels attained in the resistance group are more integral for muscle contraction and postural stability. They also reference literature that tie into the findings of the experiment-this helps track the evidence-based practice of this type of research.

This article lists out limitations of the study that prevent it from possessing a stronger hold on the current literature. The first limitation was the training frequency of each cohort; 2x/week was likely too low to provide a significant improvement. The second limitation of the study was the subject attrition; this impacts the overall bearing of the findings in the greater clinical realm. The last two limitations were the lack of assessing fall rates (since these are independent risk factors of injury) and no presence of a control group.

Discussion

Clinically speaking, this can help practitioners expand their scope beyond resistance-based movements for idiopathic Parkinson's patients. Balance training may not have the same correlation with force output and improved stability, but it is still a useful tool in precluding further injury. Using simple sensory and motor perturbations will go a long way in enhancing a patient's balance, proprioception, and strength. This study was relevant to my question because it demarcates resistance and balance as two separate intervention strategies and pits them against each other. My question stemmed from the possibility that one could be better than the other.

Current literature has already proven the positive effects of rehabilitation training on Parkinson's patients-this article does nothing short of that. The positive implication of this appraisal in the clinic is the breadth of available sound treatment to combat the effects of Parkinson's. This article solidifies balance training as a means to heighten stability in a population that struggles with it. It further fortifies the efficacy of resistance training in precluding injury and correlating these effects to higher force production. Clinical risks could include the lack of effect on the patient. After all, there was no significant difference found between the efficacy in the resistance and balance cohorts at the 12-week follow-up. A clinician could implement these two interventions and find that one could have been used all along. This is not an efficient use of the patient's time or money. If there was more statistically significant longitudinal research on balance-training's effects on stability, then it may strengthen the use of both avenues of exercise. Otherwise, clinicians may be more inclined to employ resistance training exclusively.

I am confident that there is enough validity in this paper to share it with a future client. The authors conducted the experiment in a methodical way, they included legitimate

inclusion/exclusion criteria, utilized proper statistics, and referenced knowledgeable sources. I do not believe I would implement the whole intervention at this point. There simply was no statistical difference between the two cohorts, however the authors indicated a relationship between the rate of force production and postural control in the resistance group. Further research into the efficacy of balance versus resistance should be conducted since we are an evidence-based practice.

To conclude, the study focused on the efficacy of resistance versus balance exercise to decipher which is better for PD patient rehabilitation. Though the authors facilitated a sound research experiment, the results may be harder to translate into a clinical setting. This experiment, like the current literature, nodded to resistance training as a more impressive mode of rehabilitation. However, the lack of a significant difference between the two cohorts indicates the need for more research in this area to be clinically relevant.