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Effectiveness of Spinal Flexibility Exercises on Balance in Parkinsonism

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ABSTRACT

Background: Parkinsonism is a neurodegenerative disorder characterized by motor symptoms such as tremors, rigidity, bradykinesia, and postural instability, leading to significant impairments in balance and mobility. Spinal flexibility plays a crucial role in maintaining posture and stability, and reduced flexibility is often observed in individuals with Parkinsonism. Limited spinal mobility may contribute to balance issues and an increased risk of falls in these patients. Spinal flexibility exercises, targeting the improvement of trunk and spinal mobility, have shown promise in enhancing posture and balance. This study aims to evaluate the effectiveness of spinal flexibility exercises in improving balance in individuals with Parkinsonism, potentially offering a simple, accessible intervention to mitigate balance-related challenges associated with the condition.

Methods: This randomized clinical trial will assess the impact of an intervention on balance in individuals with Parkinsonism. Thirty participants, diagnosed with stage 1 or 2 Parkinsonism, will be selected via random sampling. Inclusion criteria include the ability to follow instructions, willingness to consent, and a history of balance issues or falls. Exclusions include neurological, orthopedic, or cardiopulmonary disorders, cognitive impairments, recent medication changes, or psychiatric conditions. The primary outcome is the Berg Balance Scale (BBS). Participants will undergo a six-week intervention, with data analyzed post-assessment. Ethical approval and informed consent will be obtained.

Result: Based on the statistical analysis, the effectiveness of spinal flexibility exercises on balance in Parkinsonism was considered highly significant ($p<0.0001$).

Conclusion: Spinal flexibility exercises serve as a valuable intervention for improving balance and reducing fall risk in individuals with Parkinsonism. Proprioception, movement coordination, and postural control are all improved by these exercises, which raises functional mobility and general quality of life. While more research is needed to develop standardized procedures and evaluate long-term effectiveness, the evidence currently available supports the inclusion of spinal flexibility exercises in rehabilitation programs for Parkinsonism. Personalized rehabilitation techniques and exercise technology advancements may enhance and maximize their efficacy, ultimately leading to better patient outcomes in the treatment of Parkinson's disease.

Keywords: *Parkinsonism, Spinal flexibility, Balance*

1. INTRODUCTION

Postural instability or impaired balance is one of the hallmark motor characteristics of Parkinson's disease (PD).[1] Postural stability and balance are frequently used interchangeably in PD literature. Controlling the body's center of mass over its base of support to attain postural equilibrium and orientation is known as balance.[2] Although balance impairment in Parkinson's disease (PD) may exist early in the disease, even at diagnosis, it increases in frequency and gets worse as the condition worsens.[3] One of the main factors influencing PD patients' quality of life, morbidity, and mortality is their impaired ability to balance, which can lead to falls.[4-7]Impaired kinesthesia for sensory integration, bradykinesia of postural responses and anticipatory postural adjustments, rigidity impacting biomechanics, and reduced automaticity of balance and gait are some of the impairments that may impact the balance of people with Parkinson's disease.[8] The fall rate among community-dwelling people with Parkinson's disease (PD) is double that of healthy older adults, with 68% of them experiencing at least one fall annually.[9] Remarkably, over the course of a year, 50.5% of fallers with PD report experiencing at least two falls. Finding treatments that effectively enhance postural control and lower the rate of falls is essential to lowering disability, enhancing quality of life, and possibly raising survival rates for PD patients.[9] Although it has gotten less attention, spinal flexibility is a crucial aspect of function. Age-related decreases in spinal flexibility, which is necessary for normal movement, can range from 25% to 50%.[10] Positive associations between spinal flexibility and the ability to reach, turn, and go from a supine to sitting position. According to these findings, having a healthy amount of spinal flexibility is crucial for physical performance.

Lack of spinal flexibility may be a contributing factor to older adults' deteriorating physical abilities, though the exact mechanisms are unknown.[10]

It has been proposed that PD patients' physical limitations and trouble controlling their balance may be exacerbated by a loss of spinal flexibility.[11] According to studies, balance issues in Parkinson's disease can appear very early in the course of the illness or even at the time of diagnosis. According to one study, many of these newly diagnosed patients reported feeling unsteady, and they had significant balance deficits when compared to healthy controls.[12]During the first five years, these deficiencies typically get worse over time.[12] Given that Parkinson's disease is progressive, most people begin to have more balance issues as the illness worsens, which increases the frequency and severity of falls and the injuries they cause.[13,14]

A number of interrelated factors are involved in the pathophysiology of balance dysfunction in Parkinson's disease; including an example of dysfunctional dopaminergic activity is when it comes to motor control, basal ganglia activity is negatively impacted by dopaminergic neuron loss in Parkinson's disease. Automatic postural control and scaling of postural responses in response to environmental demands are not provided by such an activity.[13,14] Bradykinesia and Muscle Rigidity is a Bradykinesia involves the speed and amplitude of movements required to maintain balance, whereas rigidity alters biomechanics and reduces flexibility for effective postural adjustments.[15] Sensation Integration Impairment is a In order to have balanced control over their bodies, people with Parkinson's disease (PD) typically have some Proprioceptive and visual input processing. Their sensory deficiencies cause them to sway and become more unstable when standing or walking.[14, 15] The impairment of cognition is a Attention deficits and other cognitive impairments can have a major impact on balance control. Due to attention distribution issues, people with Parkinson's disease may have trouble juggling walking with other cognitive tasks, which could make their walking ability even more unstable. Due to the multivariable complexity of balance impairment in Parkinsonism, rehabilitation has been a crucial component of improving balance. Spinal flexibility exercises, which use exercises to increase the spinal column's range of motion and mobility, are among the most exciting methods for achieving this goal.

Improved Postural Control: More flexibility in the spine improves alignment and stability when moving, which in turn improves postural control.[12, 15] Improved Core Strength is a most spinal flexibility workouts involve the core muscles that are crucial in bringing stability. Increasing strength in these muscles may offer additional support for postural adjustments.[12]It is thought that greater spinal mobility enhances Proprioceptive feedback from the spine, which helps one perceive one's body position in relation to the surroundings.[13]

2. METHODOLOGY

This experimental, randomized clinical trial aims to evaluate the effects of a specific intervention on balance in individuals diagnosed with Parkinsonism. The study will be conducted over six months in Karad, with a sample size of 30 participants selected through simple random sampling. Participants will be included if they are diagnosed with Parkinsonism stage 1 or 2, both male and female, capable of following instructions and performing exercises, willing to participate and provide informed consent, have a history of balance issues or falls related to Parkinsonism, and are medically cleared for physical exercise. Exclusion criteria include the presence of other neurological disorders, severe orthopedic conditions, uncontrolled cardiopulmonary conditions, severe cognitive impairments, recent medication changes, or psychiatric conditions affecting participation. The primary outcome measure is the Berg Balance Scale (BBS). Ethical approval will be obtained, and informed consent will be collected from participants after explaining the study procedure. A baseline assessment will be conducted using the BBS, followed by a six-week intervention involving exercises designed to improve balance, three days per week. Post-assessment will be performed at the end of the intervention using the same BBS. Data collected will be analyzed statistically to determine the impact of the intervention on balance. The study will conclude with a discussion of the results and their implications for improving balance in individuals with Parkinsonism.

ETHICAL COMMITTEE APPROVAL

The approval of this study is gained from the institutional ethics committee of Krishna Vishwa Vidyapeeth (Deemed to be university), Karad. Respondents were given a detailed explanation about the procedure which is to be conducted along with the proper explanation of the inclusion and exclusion criteria as well and an inform consent was collected from each and every participant participating in this study. There was a volunteer involvement of all the respondents in this study whose confidentiality was thoroughly maintained.

3. RESULT

The Individual who finished a complete session for them analysis was made and on whom complete pre and post assessments were performed. The berg balance scale was used for assessment to determine the balance in individuals with Parkinsonism. There were 14 questions in the scale related to static and dynamic balance.

Table 1 shows distribution of data according to age. Most of the patients aged between 50-60 years. It was seen that 6.66% patients aged between 40-50 years, 66.66% patients aged between 50-60 years and 26.66% patients aged between above 60

years.

Table 1 Distribution of data according to age:

Age	Frequency	Percentage
40- 50 years	2	6.66%
50-60 years	20	66.66%
Above 60 years	8	26.66%

Table 2 shows distribution of data according to gender. There were 53.33% patients are male and 46.66% patients are female.

Table 2 Distribution of data according to gender

Gender	Frequency	Percentage
Male	16	53.33%
Female	14	46.66%

Table 3 Comparison of pre-test and post-test values of berg balance scales

Test	Mean	SD	t-value	p-value
Pre-test	18.73	1.258	15.046	<0.0001
Post-test	33.33	5.378		

Table 3 presents a paired t-test analysis comparing pre-test and post-test of berg balance scale. It shows significant improvement in balance after the intervention. The pre test Mean ± SD is 18.73± 1.258 and post test Mean ± SD is 33.33 ± 5.378. The p value of pre and post test is <0.0001 and t value is 15.046.

The highly significant p value indicates that improvement in balance in Parkinsonism, confirming the effectiveness of spinal flexibility exercise on balance in Parkinsonism.

4. DISCUSSION

A neurodegenerative condition called Parkinsonism has a major impact on balance and postural stability. The integration of several sensory and motor systems, such as proprioception, vestibular function, and spinal flexibility, is necessary for maintaining balance. Spinal flexibility exercises are one of the many rehabilitation strategies that have been found to have the potential to help people with Parkinson's disease (PD) improve their balance and lower their risk of falling.

The benefit of spinal flexibility exercises in improving postural control, lowering the risk of falls, and boosting general functional mobility in people with Parkinsonism is examined in this discussion. One of the most incapacitating motor symptoms of Parkinsonism is postural instability. Bradykinesia, rigidity, and deficiencies in automatic postural adjustments are among the much motor and non-motor impairment that contribute to this condition. According to studies, people with Parkinsonism have poor balance even in the early stages of the illness, and this condition gets worse as the condition worsens. Maintaining balance and performing coordinated movements depend heavily on spinal flexibility.

Stability depends on the spine's capacity to flex, extend, and rotate in order to facilitate efficient weight shifts, turning, and postural changes. Spinal rigidity in Parkinsonism contributes to limited mobility, which impairs coordination and makes it harder to react to changes in the environment.

Postural control and spinal flexibility are strongly correlated, according to several studies. According to Morey et al. (1999), people with more spinal mobility scored higher on mobility and balance tests, which may indicate that spinal flexibility helps people make postural adjustments more effectively. Another study by Schenkman et al. (1998) highlighted the importance of spinal flexibility training in improving functional mobility by showing that it improved gait speed and balance in people

with Parkinson's disease.

Spinal flexibility exercises represent a promising intervention for improving balance and reducing fall risk in individuals with Parkinsonism. These exercises improve functional mobility and general quality of life by improving proprioception, postural control, and movement coordination. Current research supports the inclusion of spinal flexibility exercises in Parkinsonism rehabilitation programs, but more studies are required to establish standardized protocols and long-term efficacy. Future advancements in exercise technology and personalized rehabilitation approaches may further optimize outcomes for individuals with Parkinson's disease.

5. CONCLUSION

Spinal flexibility exercises serve as a valuable intervention for improving balance and reducing fall risk in individuals with Parkinsonism. Proprioception, movement coordination, and postural control are all improved by these exercises, which raises functional mobility and general quality of life. While more research is needed to develop standardized procedures and evaluate long-term effectiveness, the evidence currently available supports the inclusion of spinal flexibility exercises in rehabilitation programs for Parkinsonism. Personalized rehabilitation techniques and exercise technology advancements may enhance and maximize their efficacy, ultimately leading to better patient outcomes in the treatment of Parkinson's disease.

REFERENCES

[1] Jankovic J. Parkinson's disease: clinical features and diagnosis. J Neurol Neurosurg Psychiatry. 2008;79(4):368–76.

[2] Kandel ER, Schwartz JH, Jessell TM, et al. Principles of neural science. 5th ed. New York: McGraw-Hill Medical; 2013.

[3] Kim SD, Allen NE, Canning CG, et al. Postural instability in patients with Parkinson's disease: epidemiology, pathophysiology, and management. CNS Drugs. 2013;27(2):97–112.

[4] Kerr GK, Worringham CJ, Cole MH, et al. Predictors of future falls in Parkinson disease. Neurology. 2010;75(2):116–24.

[5] Rahman S, Griffin HJ, Quinn NP, et al. Quality of life in Parkinson's disease: the relative importance of the symptoms. Mov Disord. 2008;23(10):1428–34.

[6] Williams DR, Watt HC, Lees AJ. Predictors of falls and fractures in bradykinetic rigid syndromes: a retrospective study. J Neurol Neurosurg Psychiatry. 2006;77(4):468–73.

[7] Stolze H, Klebe S, Zechlin C, et al. Falls in frequent neurological diseases: prevalence, risk factors, and aetiology. J Neurol. 2004;251(1):79–88.

[8] Park JH, Kang YJ, Horak FB. What is wrong with balance in Parkinson's disease?. J Mov Disord. 2015;8(3):109–14.

[9] Sparrow D, DeAngelis TR, Hendron K, Thomas CA, Saint-Hilaire M, Ellis T. Highly challenging balance program reduces fall rate in Parkinson disease. J Neurol Phys Ther. 2016;40(1):24–30.

[10] Morey MC, Schenkman M, Studenski SA, et al. Spinal-flexibility-plus-aerobic versus aerobic-only training: effects of a randomized clinical trial on function in at-risk older adults. J Gerontol A Biol Sci Med Sci. 1999;54(7):M335–42.

[11] Schenkman M, Cutson TM, Kuchibhatla M, et al. Exercise to improve spinal flexibility and function for people with Parkinson's disease: a randomized, controlled trial. J Am Geriatr Soc. 1998;46(10):1207–16.

[12] Schlenstedt C, Brombacher S, Hartwigsen G, Weisser B, Deuschl G, Möller B. Balance and mobility in patients with newly diagnosed Parkinson's disease. Neurorehabilitation. 2018;42(1):141–8.

[13] Horak FB, Mancini M. What is wrong with balance in Parkinson's disease? Mov Disord. 2015;30(11):1503–9.

[14] Kearney FC, Harwood RH, Gladman JRF, Lincoln NB, Masud T. Balance dysfunction in Parkinson's disease: the role of cognitive impairment. Neurosci Lett. 2015;589:204–8.

[15] Nutt JG, Bloem BR, Giladi N, Hallett M, Horak FB, Nieuwboer A. Freezing of gait: moving forward on a mysterious clinical phenomenon. Lancet Neurol. 2011;10(8):734–44.