

# Differences Between Exergaming Rehabilitation and Conventional Physiotherapy on Quality of Life in Parkinson's Disease: A Systematic Review and Meta-Analysis

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## Abstract

Parkinson's disease (PD) is a neurodegenerative disorder that presents motor and non-motor symptoms involving a variety of psychomotor and cognitive conditions like attention and memory limitation and emotional changes including apathy, depression, and anxiety. The existence of the motor and non-motor symptoms limit function and activities of daily living (ADL), leading to a reduction in quality of life (QoL). Exergaming rehabilitation including all the types of immersion, allows the interaction of the individual with digital games through the implementation of repetitive functional activities. Conventional physiotherapy uses specified programs that include a variety of active exercises. The aim of this study was to collect, analyze and present the outcomes on activities of daily living, physical and cognitive function, and quality of life under the use of exergaming rehabilitation in comparison with conventional physiotherapy. This systematic review was register in Prospero database (CRD42020196946) and followed the PICO model for the searching of the studies. Five electronic databases were searched for eligible studies until February 2021. For the statistical analysis, the mean, standard deviation, and 95% confidence interval were used to calculate effect sizes between groups. To determine homogeneity the Levene's test was applied and for heterogeneity, statistical index  $I^2$  was used. Forest plots were used to illustrate the mean difference and confidence interval between the experimental group and control group for each of the included studies. Multiple meta-analyses were performed in order to the outcomes of quality of life, activities of daily living, physical and cognitive function. A total of 228 studies were initially screened and following detailed examination, fourteen randomized control trials entered the meta-analysis where 548 participants were extracted. All studies were published in the last 10 years. Exergaming Rehabilitation related with improved quality of life ( $p=0.687$ , 95% CI -1.682 - -0.734), balance ( $p=0.039$ , 95%CI 0.364 - 13.689), ( $p=0.018$ , 95% CI 0.446 - 4.830) and gait ( $p=.005$ , 95% CI 0.351 - 1.924). No significant deference was found between groups regarding the Unified Parkinson Disease Rating Scale ( $p=0.196$ , 95% CI -5.970 - 1.225) and the Time Up and Go Test ( $p=0.12$ , 95% CI 0.446 - 4.830). Exergames as a rehabilitation combines modern technology and as a technique can be used to provide alternative interactive intervention. The use of exergaming rehabilitation as an intervention tool can meet the needs and abilities of people with Parkinson's Disease, as these systematic review and meta-analysis have found positive results showing positive results in physical function and quality of life in people with Parkinson's Disease. The application of more advanced technological exergaming rehabilitation systems provides variability of gamification and simultaneous combination of exergaming programs that allow the execution of more realistic activities, raising the physical and emotional interaction between the individual and the environment. However, more future studies are needed so the results can be further supported and possibly expanded into other important areas for the patients who use it, like the impact on cognition and mental health.

**Keywords:** Parkinson's disease, conventional physiotherapy, quality of life, functionality, exergaming

