



The effect of a virtual reality based exercise on cognitive and physical function in older adults with cognitive impairment: Systematic review and meta-analysis

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Introduction

Emerging evidence has shown that exercise and physical activity might have positive effects on cognitive and physical function for older adults with cognitive impairment (CI) or dementia. However, older adults rarely doing exercise regularly. To enhance motivation, the use of virtual reality (VR) has been applied recently.

Purpose

To summarize the effect of using VR exercise among older adults with cognitive impairment on cognitive and physical function.

Methods

In this study, a systematic review and meta-analysis were conducted to summarize the effect of using VR exercise among older adults with cognitive impairment. Medline, Pubmed, Scopus, Web of Science, CINAHL and Embase were systematically searched from 1966 until March 2021. Studies that used VR exercise and met inclusion criteria were included. Quality of studies were assessed with the Physiotherapy Evidence Database Scale (PEDro).

Results

Fourteen studies had been included in the analysis, there was a significant benefit of VR exercise for global cognition (Hedge's $g = 0.55$, [95% CI=0.35, 0.76]) and learning and memory (Hedge's $g = 0.32$, [95% CI=0.22, 0.42]), the effect size on motor function was not significant.

	Hedge's g	95%CI	P value
Global cognition	0.55	0.35~0.76	$p < 0.001$
Executive function	-0.06	-0.17~0.06	$p = 0.35$
Learning and memory	0.32	0.22~0.42	$p < 0.001$
visuospatial	0.42	-0.31~1.16	$p = 0.26$
Muscle strength	0.41	-0.07~0.89	$p = 0.09$
Walking ability	0.04	-0.16~0.24	$p = 0.68$
ADL / IADL	0.14	-0.14~0.42	$p = 0.33$

Discussion

Effect of global cognition and learning and memory are significant, the reasons might be that interactive video benefits to brain and cognitive health, the enjoyment and attractiveness of VR characteristics may increase motivation and lead to extensive training effects resulting in cognitive improvement.

Effect of physical function is not significant may be due to the specificity property and low intensity of the exercise training program.

Conclusions

VR exercise significantly improved global cognition and learning and memory in elders with cognitive impairment. VR exercise with specific exercise type might be effective to improve a cognitive impaired patient's cognition and physical function.



PRISMA 2009 Flow Diagram

