

Possible Advantages of Virtual Reality-Based Exercises Over Traditional Exercises? A Mini-Review

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ABSTRACT

Over the last decade, virtual reality (VR) exercises have gained lot of interest in the field of rehabilitation therapy. Several health benefits and favorable clinical outcomes have been reported in different populations following VR-based exercise programs. VR can play a unique role in the rehabilitation of post-COVID-19 subjects based on its stress relieving and fatigue-distracting effects reported in several studies. But whether VR exercises have advantages that could be superior to traditional exercise has been a question raised by several researchers. In this context, we will briefly discuss the potential advantages of VR exercises over traditional aerobic exercises.

KEYWORDS: Virtual reality; Rehabilitation; Traditional exercise; post-COVID-19

INTRODUCTION

Physical exercises have traditionally been recommended to induce multiple physiological benefits in both healthy and diseased people. Physical exercise improves physical and mental functions, cardiorespiratory fitness, and quality of life; however, reduced patients' adherence and lack of motivation represent the main barriers to traditional exercises. Virtual reality-based exercises could play a role in improving the long-term adherence to exercise rehabilitation programs. Virtual Reality (VR) is an emerging technology that has been applied successfully in many settings of rehabilitation with different objectives, such as pain management, improving functional ability, muscular strength, range of motion, mood, and quality of life [1]. Recently, virtual Reality (VR) can be used in the rehabilitation of post-COVID-19 subjects who have persistent physical, psychological, and cognitive impairments after discharge from the ICU and/or hospital [2]. The immersion of VR may distract the patient from experiencing fatigue or anxiety and increase his/her adherence to therapy. There are three types of VR: immersive, non-immersive, and interactive. Immersive

VR comprises head-mounted displays, body movement sensors, real-time graphics, and advanced interface devices to create a completely virtual environment, whereas non-immersive VR utilizes an interface, such as a flat-screen TV/computer screen, and requires the usage of a corresponding keyboard, or a controller [3]. Interactive VR enables users to interact with virtual objects through devices (e.g., gloves digital glasses) which produce the sensation of manipulating real items, such as picking up an object [4]. Several studies have investigated the clinical outcomes of virtual reality exercises and their findings are to be discussed.

DISCUSSION

For younger participants, VR exercises show greater enjoyment and enhancements in the mood and energy, and for older adults, VR interactive training influences postural control and reduces the risk of falls by stimulating the sensory cues responsible for maintaining balance and orientation [5]. A recent study compared the immersive virtual reality using an interactive game with bicycling exercises and found that VR exercise has the potential to

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exert a positive impact on individuals' physiological, psychological, and rehabilitative outcomes compared with traditional exercise [6]. Another recent study reported that participants in the VR cycling group showed significantly higher enjoyment and self-efficacy and a lower rating of perceived exertion (RPE) compared with those in the traditional cycling group [7]. In addition, VR provides additional benefits to traditional exercises regarding cognitive flexibility and selective attention in healthy people [8]. Furthermore, a recent study assessed the biological and motivational effects of aerobic exercises with virtual reality and traditional exercise and found that virtual reality exercises increased the enjoyment of exercise sessions and showed more motivational effects, whereas traditional exercises showed more physical gains [9].

The VR-based exercises could have other potential advantages over traditional rehabilitation exercises that can be listed as follows:

a) The virtual environment may act as a distractor so that the attention of the user is shifted from the exercise fatigue towards the attention to the elements in the scenario [5]. This advantage is of particular importance for post-COVID-19 subjects who experience persistent fatigue, dyspnea, and poor tolerance to exercise.

b) VR-based exercises can offer a good opportunity to practice activities of daily living that are not present in conventional rehabilitation settings in a safe and controlled environment through motivational and recreational activities [10].

c) The satisfaction and the compliance of patients when they interact with the virtual environment are higher than those with conventional rehabilitation environments [11]. The patients' preference for VR can be reflected in terms of improved adherence to exercises. This is very important, particularly, for the long-term rehabilitation programs in which higher dropout rates are not uncommon. It has been shown that VR provides better adherence to neurorehabilitation programs than to traditional rehabilitation [12].

d) VR provides direct and immediate feedback so that the difficulty level of exercise can be easily adapted to the patient's tolerance and needs [13]. Real-time feedback on physical performance can increase awareness and control over exercises and keep the motivation high when reaching the predefined goals [14].

e) The use of virtual reality interventions in neurorehabilitation enables the implementation of telerehabilitation to motivate and activate patients to proceed forward with the rehabilitation process at home [15]. Also, contrary to traditional exercise programs that are often repetitive and monotonous, VR involves stimulating activities that result in activated attention and motivation, as well as improved neuroplasticity and functional recovery.

f) Moreover, deconditioned patients who could be excluded from conventional aerobic/resistance exercise programs can benefit from the less physically demanding VR exercises [16].

CONCLUSION

Compared to traditional exercises, virtual reality exercises can have several advantages which include higher distraction from exercise-induced fatigue and breathlessness, real-time feedback with higher motivation, greater enjoyment and adherence, better preference by patients, more recreation, more reduction of stress or depression, greater facilitation of cognitive abilities, and better

suitability for the telerehabilitation programs. These benefits can be of importance for post-COVID-19 subjects who could experience persistent fatigue, dyspnea, anxiety/depression, and/or cognitive problems.

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