

## Short Communication

# Virtual Reality as a Treatment for Vestibular Dysfunction: A New Paradigm of Clinical Physiotherapy

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The vestibular system is a reference in balance control because it acts as a gravity sensor controlling the dynamic posture when the individual is walking, for example [1, 2]. Vestibular dysfunctions may be peripheral and/or central, occurring by primary or secondary causes, having as main manifestations, body sway under visual or somatosensory conflict conditions, reduced stability and functional capacity, gait deviations and falls [3]. Vestibular rehabilitation is based on mechanisms related to neuronal plasticity of the central nervous system, known as adaptation, habituation and substitution, where nerve cells establish new synaptic connections expanding its neural network [4]. A relatively new treatment based on games or virtual activities has been used in vestibular rehabilitation. Thus, the aim of this study is to present the effects of exposure therapy to virtual reality in vestibular rehabilitation.

Therapy in virtual reality suggests a connection between the individual and the machine, implying that it is in another reality in which the perception of the environment is modified by sensory

### Abstract

The vestibular system is a reference in balance control because it acts as a gravity sensor controlling the dynamic posture. Vestibular dysfunctions may be peripheral and/or central, presents different manifestations (visual or somatosensory conflict), reduced stability and functional capacity, gait deviations and falls. The use of virtual reality has use in treatment of phobias, Parkinson's disease, after stroke, children with cerebral palsy as well as vestibular disorders. Vestibular rehabilitation is based on mechanisms related to neuronal plasticity of the central nervous system and virtual games activities have been used. The virtual reality therapy in the treatment of vestibular dysfunction presents few studies run on journals; however, the few studies have evidenced good results, which, nevertheless, need to be further explored, applying stricter protocols. The therapy has contributed to improvement of postural balance, motor coordination, flexibility, physical function, also increased stability limit, reduce dizziness levels and rates of falls, providing functional independence and quality of life. Considering that, this feature may be relevant in the treatment of vestibular dysfunctions it is essential to investigate how virtual reality is being aggregated in the vestibular rehabilitation process.

**Keywords:** Virtual reality; Vestibular dysfunction and physiotherapy

stimuli [5]. The use of virtual reality in healthcare was used since there was the first case of success in the treatment of phobias [6] and currently is being used in the rehabilitation of patients with Parkinson's disease, in the upper limb recovery of hemiparetic patients after stroke [7] and in the treatment of children with cerebral palsy with emphasis on motor control and balance [8].

In virtual reality exposure therapy it is possible to simulate computationally real spaces in a multisensory 3D context through resources that increase feelings such as special helmets, belts, headphones, platforms and equipment with LCD displays, that is, the therapy allows the user to interact with the virtual world in real time through multi sensations (hearing, sight, touch and smell) to feel involved and motivated to perform a given activity. The visible benefit of this therapeutic mode is the provision of a variety of stimuli if compared to traditional methods of vestibular rehabilitation presenting the patient sensory conflicts at different levels of difficulty and in a safe environment that will promote correction of balance and posture, improved mobility, the functionality of upper and lower limbs, besides promoting greater motivation for the patient in exercise performances [9-11].

The virtual reality therapy in the treatment of vestibular dysfunction presents few studies run on journals; however, the few studies have evidenced good results, which, nevertheless, need to be further explored, applying stricter protocols. The therapy has contributed to improvement of postural balance, motor coordination mobility, flexibility, physical function, also increased stability limit; reduce dizziness levels and rates of falls, providing functional independence and quality of life [5, 12].

Considering that, this feature may be relevant in the treatment of

vestibular dysfunctions it is essential to investigate how virtual reality is being aggregated in the vestibular rehabilitation process, what types of devices and games are being more used and how effective they are. So that the therapy for virtual reality exposure become customary in clinics, offices and even in the households.

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