



Short Review

Falls, Vestibular Rehabilitation and Everything in Between

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Abstract

Falls are one of the most severe issues of the current century. Every third person age 65 and older will fall at least once a year. Two-thirds of adults over the age of 65 have deficits in the vestibular system. A direct link was found between a vestibular deficiency and falls among the elderly. A prospective study with 24 months of follow-up, among an elderly population at an average age 83.4 years, able to walk independently, found that a low score on the Zur Balance Scale (ZBS), the number of medications taken and history of a fall were the most significant indicators predicting a fall that could result in fracture or severe injury.

The Zur Balance Approach (ZBA) was developed to reduce number of falls and improve balance. It relates to the complementary systems: visual, somatosensory (which includes muscle, fascia, and skeleton) and limbic, as essential components of the patient's assessment and treatment. In the ZBA, the focus is on the patient: why now, how much encouragement to provide, and when to return to daily life, with the maximum added value and minimum discomfort. Tele-medicine might increase patients' motivation to exercise and may even help determine the most appropriate exercises to use, while minimizing the time, cost and risk for falls.

The BBalance system is a digital, vestibular rehabilitation-based exercise system that can be easily used in any language, any place and at any time. To evaluate its efficacy, a one-month pilot study was conducted at a retirement home. A high percentage of participants completed training and their balance improved. The path to preventing the next fall must start with a sensitive test that can determine a patients' risk for a fall, as high, medium or low. It must be accompanied by a personalized exercise program that engages all of the body's systems that are involved in the vestibular deficiency.

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Introduction

Falls are one of the most severe issues of the current century. World statistics indicate that every third person age 65 and older will fall at least once a year. Amongst the elderly population, a fall is the most common reason for visiting an emergency room. Falls can cause severe bodily injuries and fractures, or anxiety from another possible fall. It can also negatively affect one's sense of confidence and self-worth, level of independence and mobility [1]. In addition to the physical and emotional pain and suffering, a fall can also be costly. According to the US Centers for Disease Control and Prevention, annual treatment costs incurred due to a fall amongst the elderly is up to \$50 Billion [2]. If the fall rate does not decrease, the cost of treatment due to falls will reach \$101 billion by the next decade [3]. The reasons for a fall are related to external factors such as the surface or other unpredictable conditions, and internal factors such as high or low blood pressure, significant decrease in blood glucose levels, consumption of more than 6 types of medicines and problems with balance and the inner ear- vestibular system [4-6].

Two-thirds of adults over the age of 65 have deficits in the vestibular system. A direct link was found between a vestibular deficiency and falls among the elderly [4,7]. Vestibular deficits increase with age and together with increases in the life span, the potential for a fall increases as well, which can have a severe impact on quality of life. The harm and costs to the person, the family and the community can be enormous. Common clinical balance examinations such as the Berg Balance Scale or Up & Go, have low ceiling effects and cannot identify the actual deficiency in cases where the patient is independent, fully functional and highly mobile [8]. In an attempt to predict a fall amongst independent patients, we conducted a prospective study with 24 months of follow-up, among an elderly population at an average age 83.4 years, who walk independently. We found that a low score on the Zur Balance Scale, the number of medicines taken and history of a past fall were the most significant indicators predicting a fall that could result in fracture or severe injury [5].

In my Vestibular Rehabilitation (VR) courses, I emphasize that VR is very important in various fields, including Orthopedics, Neurology, Geriatrics and Child Development. The efficiency of VR with balance disorders is well-known and documented in several books and articles [9-11]. The treatment is based on tailor-made exercises that are aimed to encourage alternative brain activity, in order to compensate for existing deficiencies. VR treatments are based on special exercises intended to improve gaze and postural stability. These were described in the literature by the leaders in the field, Cawthorne and Cooksey, who developed Habituation, exercises after World War II [12-14]. During the 1990s, adaptation was a new point of view, coined by Susan Herdman, who wrote the "bible" book, "Vestibular Rehabilitation" for physiotherapists, occupational therapists and physicians [9]. Compensation and substitution mechanisms were developed for cases where the vestibular system does not operate [15].

In my practice, I encountered cases where I was not able to treat patients' dizziness and balance disorder. I asked questions regarding what to do and when? Who should be treated more and who less? When does the treatment worsen the problem more than it helps? And why do many patients discontinue treatment. Does it have to do with the monotony of the exercises, symptoms worsening during and after the exercises, lack of diligence in performing the exercises at home, pain and discomfort that limits the movements, and abstention related to fear and anxiety?

As vestibular physiotherapists, we see that a patient with a vestibular deficit, often presents with additional physical and emotional issues, such as pain that is projected from the soft tissues of the body (muscle, fascia or tendon), general anxiety that is centered around a disease or from being in crowds (agoraphobia). People with vestibular deficiency will use the visual and proprioceptive systems in unconscious ways because they cannot trust the vestibular system to transmit the correct information. If this behavior continues overtime, it might lead to an unconscious neglect of using the vestibular system. In this case, a cycle of aggravation might exist that includes unconscious muscle spasms, a decrease in joint range of movement, and increased anxiety, which might create a defense mechanism that presents as avoidance through functional inability. These phenomena can hinder rehabilitation. Therefore, it is vital that they be addressed by the physiotherapist and/or psychologist as part of the overall therapeutic goals.

Hence, a new practice methodology, the Zur Balance Approach (ZBA) was developed. It relates to the complementary systems: visual, somatosensory (which includes muscle, fascia, skeleton) and limbic, as an inseparable part of the patient's assessment and treatment. In the new ZBA method, the focus is on the patient: why now, how much encouragement to provide, and when to return to daily life, with the maximum added value and minimum discomfort. The world of vestibular diagnosis and assessment is expanding and is entering the digital health world with developments such as the video Head Impulse Test for assessing the Vestibulo- Ocular Reflex (VOR) and the functional Head Impulse Test for biofeedback of the VOR, both based on accelerometers and sophisticated cameras. The Subjective Visual Vertical Test is a laser-based system and there are others, as well. It is important to enter into the cyber world for diagnostics and treatments. Tele-medicine might increase patients' motivation to exercise and, in some cases, may even increase the accuracy in choosing the most appropriate exercises, while minimizing the time, cost and risk for falls. A one-month pilot study that was conducted at a retirement home with elderly residents, demonstrated that there is a very strong preference for using a digital, vestibular rehabilitation-based exercise system called B balance that we developed to reach any person in the world who suffers from imbalance and risk of falling. The BBalance system can be easily used in any language, any place and at any time. We found that with the B Balance system, a high percentage of participants completed training and their balance increased. The users' subjective reports indicated improvement in their daily life activities, freer movement while walking, going up or down the steps and increased self-confidence.

From my clinical experience as a physiotherapist who has treated thousands of patients in a dizziness and balance center, different hospital departments, geriatric rehabilitation centers, ambulatory walk-in clinics and in the community, I believe the next fall can be prevented.

The path to achieve this must start with a sensitive test that can determine a patients' risk for a fall, as high, medium or low. It must be accompanied by a personalized exercise program that engages all of the body's systems that are involved in the deficiency. In 2006, we found, a significant difference in clinical vestibular tests, among an independent elderly population who had experienced a fall that resulted in fracture and hip replacement surgery and among adults who did not report a fall [4]. Making the exercises accessible, with an emphasis on the vestibular system is also vital for independent elderly populations at medium-to-high functional levels. We must continue to research our ability to prevent a fall by personalizing the exercise program, making it accessible and easy to use, whenever needed.

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