

# The effect of a physical training with the use of an exoskeleton in the rehabilitation of institutionalized elderly patients at high risk of falls

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Physical training exerts several systemic beneficial effects in elderly, also in reducing the risk of falls and fractures [1]. The aim of this study was to evaluate the effects of a physical training with the exoskeleton (HBP) [2,3] on gait and balance in the institutionalized elderly at severe risk of falls. The study included a series of elderly subjects (n = 16; mean age: 87, ds = ± 6.8 males 5) living in nursing home and at high risk of falls (Tinetti score <19). Baseline evaluation included: i) the Tinetti balance and Gait evaluation scale; ii) the short physical performance battery (SPPB). Participants were randomly assigned to one of the two groups: i) in the HBP group, subjects received physical exercise training using HBP; ii) in the Exercise group subjects received physical exercise training without the use of the HBP. Each patient was engaged in three sessions of physical exercise a week under instruction of a therapist. The HBP is a fully-articulated orthosis, consisting of four basic elements which come into contact with different anatomical zones. As a result, users enjoy great freedom of movement and continuous central reprogramming of the users' postural attitude.

Exercise with the HBP seems to be more efficacious in quickly improving balance and gait in the elderly compared to the effectiveness of exercise without the HBP, with a significant reduction of the risk of falls. In elderly, compensatory response to neuronal deficits or loss of neuronal specialization produce hyperactivation of specific brain areas, particularly in the pre-frontal cortex (PFC) to improve task accuracy, posture and gait. Age-related decline in brain activity can reduce these compensatory response especially in oldest old. A recent study showed that the HBP rehabilitation device may improve motor control by stimulating the PFC [3].

## References

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## Key words

Exoskeleton, elderly, rehabilitation.