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## FALLS IN THE ELDERLY A BIBLIOMETRIC ANALYSIS OF STUDIES WITH ACCELEROMETRY

Eduarda Elisa Martins Amaral<sup>1</sup>, Danilo Silva Barbosa<sup>1</sup>,  
Naicha Stefanie Félix Souza<sup>1</sup>, Lucas Fernando Alves e Silva<sup>1</sup>,  
Alex Harley Crisp<sup>1</sup>

<sup>1</sup> Universidade Federal do Pará (UFPA), Instituto de Ciências da Saúde, Belém, Pará, Brasil

**Background:** Population aging is a global trend, and falls represent one of the main public health problems in the elderly. The accelerometer can be an ally in preventing these events by identifying risk factors and predicting falls. The number of research with accelerometry has been growing exponentially in the last decades, and following the evolution allows identifying more investigated topics and knowledge gaps.

**Objectives:** To perform a bibliometric analysis of primary studies on accelerometry and falls in the elderly.

**Methods:** The search strategy (elder\* OR old\* OR aged AND fall\* AND acceleromet\*) was performed in March 2023 in the Web of Science database, applying a filter for original articles. Records were saved in BibiTeX format and analyzed in R (version 4.2.2) using the "bibliometrix" package (version 4.1.2).

**Results:** We identified 703 articles by 2751 authors, published between 1963 and 2023. The growth rate was 4.73% per year, with exponential growth from 2008. The studies were published in 310 scientific journals, most notably the journal *Gait & Posture* (n=43) and averaged 33.6 citations per paper. The researcher Stephen Lord, from the University of New South Wales, Australia, had the largest number of publications (n=19), being recognized as one of the greatest references in the areas of balance, gait and falls in the elderly. The article entitled "Evaluation of a threshold-based tri-axial accelerometer fall detection algorithm" by Bourke et al. This paper describes the evaluation of a triaxial accelerometer-based fall detection algorithm, tested in different settings and physical activity contexts in the young and elderly. The co-occurrence network analysis of the authors' keywords resulted in the formation of 3 clusters, with emphasis on the themes of fall detection ("fall detection", "inertial sensors", "gyroscope", "machine learning", "deep learning", "smartphone"), gait and balance ("gait", "balance", "accidental fall", "Parkinson's disease") and physical activity ("physical activity", "walking", "mobility", "rehabilitation", "exercise").

**Conclusion:** The bibliometric analysis of the primary studies on accelerometry and falls in the elderly revealed a marked increase in the number of publications from 2008 onwards, evidencing the growing interest in motion sensors in the face of the aging population challenge. The most widely covered topics in the research were fall detection, gait/balance, and physical activity.

**Implications:** Studies on falls in the elderly using accelerometry are of great interest and relevance in the field of geriatrics and gerontology, and research in this area has contributed to the advancement of knowledge and the development of new technologies for the prevention of falls in the elderly.

**Keywords:** Aging, Falling, Accelerometer

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## A RANDOMIZED CONTROLLED TEST PROTOCOL EVALUATING THE EFFECTS OF A CEREBELLO-SPINAL STIMULATION SESSION ON POSTURAL CONTROL IN ELDERLY

Eduardo Santos da Costa Moreira<sup>1</sup>, Laura Alice Santos Oliveira<sup>1</sup>

<sup>1</sup> Programa de Pós-Graduação em Ciências da Reabilitação, Centro Universitário Augusto Motta (UNISUAM), Rio de Janeiro, Rio de Janeiro, Brasil

**Background:** Balance is an important component of the functional capacity of the elderly and deficits in this ability can significantly affect their quality of life and independence. Transcranial direct current stimulation (tDCS) is a non-invasive technique that can increase the effect of exercise protocols on balance improvement in the elderly, by modulating the excitability of the stimulated areas, generating a plastic potential. Several protocols using tDCS and aiming at improving balance in the elderly have been tested in previous studies, with promising results. However, no study has investigated the impact of the use of cerebellum-spinal tDCS on the outcomes related to postural control, balance, and autonomy in healthy elderly.

**Objectives:** To investigate the effect of a single session of cerebellum-spinal tDCS on measures of postural control in older adults at increased risk of falls.

**Methods:** This is a double-blind, randomized, placebo-controlled clinical trial involving individuals aged 60 to 85 years with increased risk of falling. Participants will be interviewed to research inclusion and exclusion criteria. Those eligible who agree to participate will be randomly divided into the intervention and control groups. First, participants will be assessed with the following instruments: Functional Reach Test on Force Platform; Four Stage Balance Test; and Timed Up and Go. Immediately thereafter, they will receive a single session of cerebellum-spinal tDCS lasting 20 min and 2mA intensity. The anodic electrode will be fixed over the cerebellum and the cathodic electrode will be over the thoracic region (approximately T8). Immediately after the removal of the electrodes, the subjects will be reassessed with the same instruments. 48 h after the cerebellum-spinal tDCS session the participants will undergo a third evaluation with the same tests. The distribution profile of the data will be checked using the Shapiro-Wilk test, and according to the result, the comparison between the intervention and control groups, and the association between variables will be analyzed with the relevant statistical tests.

**Results:** It is expected that a single session of cerebellum-spinal tDCS will be able to promote changes in postural control, leading to an improvement in the performance of tests related to balance and autonomy in the sample of elderly at risk of falling.

**Conclusion:** The study is under development. The project will be defended this semester, and the project will be sent to the ethics committee of the institution. Following its approval, the volunteer recruitment phase will begin.

**Implications:** This study will aid in the understanding of the effects of using cerebellum-spinal tDCS on balance in older adults at increased risk of falls may increase the range of options of stimulation sites available for intervention using tDCS in this population.

**Keywords:** Fall risk, tDCS, Elderly

**Conflict of interest:** The authors declare no conflict of interest.

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