

Safety Literature 2nd June 2024

Development of fear of falling after proximal femoral fracture

Baltes M, Stephan A, Andrich S, Meyer G. Pflege 2024; ePub(ePub): ePub.

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PMID: 38809228

Abstract

BACKGROUND: Proximal femoral fracture is common in older people. Beyond a long recovery process and significant permanent functional limitations, older people often experience subsequent Fear of Falling. The phenomenon of Fear of Falling is not fully understood; qualitative research is underrepresented but can provide insights into the experience of those affected.

OBJECTIVES: We aimed to explore the experiences of Fear of Falling development and to what extent it affects peoples' life after proximal femoral fracture.

METHODS: We conducted semi-structured, in-depth interviews with nine older people, aged between 61 and 88, who participated in a prospective observational study. Interview data were analysed through inductive content analysis.

RESULTS: Six major themes emerged: The development of Fear of Falling; the effect of FoF and hope for recovery; alternating between moments of fear and security; fear of helplessness and of losing independence; strategies for dealing with Fear of Falling and maintaining independence; need of support by health care professionals.

CONCLUSION: To identify and support older people in coping with Fear of Falling (after proximal femoral fracture), strategies for dealing with Fear of Falling across occupational groups and all healthcare settings should be implemented. Nurses have a key role in this process.

Language: en

Keywords: nursing; qualitative research; older people; ältere Menschen; fear of falling; femoral fractures; Femurfraktur; Pflege; qualitative Forschung; Sturzangst

Falls in older adults: approach and prevention

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Abstract

Falls are a major public health problem, occurring in more than 27% of adults 65 years and older and costing the U.S. health care system tens of billions of dollars each year. The most common risk factors are prior falls, balance disorders, fear of falling, and dementia. Regular physical activity reduces fall risk. Identifying injuries is the first step in evaluating older adults who have fallen. The patient's history may be inaccurate if they have cognitive impairment, and the physical examination can result in false-negative findings. If injury status cannot be determined and suspicion for injury remains high, clinicians can consider whole-body computed tomography (i.e., pan-scan) to evaluate the head, cervical spine, chest, abdomen, and pelvis. After addressing injuries, the next steps are to identify the cause of the fall and implement measures to reduce future fall risk. The Centers for Disease Control and Prevention has developed an easy-to-use tool to screen for and reduce fall risk, known as STEADI (Stopping Elderly Accidents, Deaths, and Injuries). An affirmative answer to any of the three STEADI screening questions indicates further evaluation with a timed up and go test, 30-second chair stand test, and four-stage balance test. If results of these tests are abnormal, multicomponent interventions are indicated to reduce future fall risk. These components include evaluating environmental and home safety factors and optimizing care of chronic medical conditions, such as diabetes mellitus, hypertension, osteoporosis, pain, urinary urgency and incontinence, and depression. Polypharmacy and drugs that increase risk of falls should be avoided, when possible. Optimization of vision and hearing correction, podiatry care, and appropriate use of ambulation devices are also important.

Language: en

Keywords: *Accidental Falls/prevention & control; Aged; Aged, 80 and over; Female; Geriatric Assessment/methods; Humans; Postural Balance; Risk Assessment/methods; Risk Factors; United States

Prevalence and outcomes of fear of falling in older adults with falls at the emergency department: a multicentric observational study

García-Martínez A, García-Rosa S, Gil-Rodrigo A, Machado VT, Pérez-Fonseca C, Nickel CH, Artajona L, Jacob J, Llorens P, Herrero P, Canadell N, Rangel C, Martín-Sánchez FJ, Del Nogal ML, Miró. *Eur. Geriatr. Med.* 2024; ePub(ePub): ePub.

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PMID: 38809489

Abstract

PURPOSE: Fear of falling (FOF) may result in activity restriction and deconditioning. The aim of the study was to identify factors associated with FOF in older patients and to investigate if FOF influenced long-term outcomes.

METHODS: Multicentric, observational, prospective study including patients 65 years or older attending the emergency department (ED) after a fall. Demographical, patient- and fall-related features were recorded at the ED. FOF was assessed using a single question. The primary outcome was all-cause death. Secondary outcomes included new fall-related visit, fall-related hospitalisation, and admission to residential care. Logistic regression and Cox regression models were used for statistical analyses.

RESULTS: Overall, 1464 patients were included (47.1% with FOF), followed for a median of 6.2 years (2.2-7.9). Seven variables (age, female sex, living alone, previous falls, sedative medications, urinary incontinence, and intrinsic cause of the fall) were directly associated with FOF whereas use of walking aids and living in residential care were inversely associated. After the index episode, 748 patients (51%) died (median 3.2 years), 677 (46.2%) had a new fall-related ED visit (median 1.7 years), 251 (17.1%) were hospitalised (median 2.8 years), and 197 (19.4%) were admitted to care (median 2.1 years). FOF was associated with death (HR 1.239, 95% CI 1.073-1.431), hospitalisation (HR 1.407, 95% CI 1.097-1.806) and institutionalisation (HR 1.578, 95% CI 1.192-2.088), but significance was lost after adjustment.

CONCLUSION: FOF is a prevalent condition in older patients presenting to the ED after a fall. However, it was not associated with long-term outcomes. Future research is needed to understand the influence of FOF in maintenance of functional capacity or quality of life.

Language: en

Keywords: Emergency care; Concerns about falling; Older fallers

Blood pressure drugs linked to more fractures, falls in VA nursing homes

Harris E. J. Am. Med. Assoc. JAMA 2024; ePub(ePub): ePub.

(Copyright © 2024, American Medical Association)

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PMID: 38787550

Abstract

Long-term Veterans Health Administration (VA) nursing home residents who started new medications to treat high blood pressure were more than twice as likely to experience a fracture than those who did not, according to a cohort study involving more than 29 600 VA participants, almost all male, aged 65 years or older.

Residents initiating antihypertensives also had an 80% increased risk of a fall that required an emergency department or hospital visit and a 69% increased risk of syncope. Moreover, antihypertensives were associated with a greater risk of fractures among people with dementia, as well as among those with higher baseline blood pressure or who hadn't previously used antihypertensive medications.

When deciding whether to prescribe an antihypertensive medication for an older person living in a nursing home, clinicians should "contextualize a limited life expectancy against the anticipated time horizon over which the cardiovascular benefits are likely to manifest," the researchers wrote in JAMA Internal Medicine.

Language: en

Falls, fracture and frailty risk in multiple sclerosis: a Mendelian Randomization study to identify shared genetics

Jeong S, Tsai MJ, Shen C, Hsu YH. *J. Bone Miner. Metab.* 2024; ePub(ePub): ePub.

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PMID: 38801451

Abstract

INTRODUCTION: Patients with multiple sclerosis (MS) commonly present musculoskeletal disorders characterized by lower bone mineral density (BMD) and muscle weakness. However, the underlying etiology remains unclear. Our objective is to identify shared pleiotropic genetic effects and estimate the causal relationship between MS and musculoskeletal disorders.

MATERIALS AND METHODS: We conducted linkage disequilibrium score regression (LDSR), colocalization, and Mendelian randomization (MR) analyses using summary statistics from recent large-scale genome-wide association studies (GWAS), encompassing MS, falls, fractures, and frailty. Additional MR analyses explored the causal relationship with musculoskeletal risk factors, such as BMD, lean mass, grip strength, and vitamin D.

RESULTS: We observed a moderate genetic correlation between MS and falls ($R_G = 0.10$, P -value = 0.01) but not between MS with fracture or frailty in the LDSR analyses. MR revealed MS had no causal association with fracture and frailty but a moderate association with falls (OR: 1.004, FDR q -value = 0.018). We further performed colocalization analyses using nine SNPs that exhibited significant associations with both MS and falls in MR. Two SNPs (rs7731626 on ANKRD55 and rs701006 on OS9 gene) showed higher posterior probability of colocalization (PP.H4 = 0.927), suggesting potential pleiotropic effects between MS and falls. The nine genes are associated with central nervous system development and inflammation signaling pathways.

CONCLUSION: We found potential pleiotropic genetic effects between MS and falls. However, our analysis did not reveal a causal relationship between MS and increased risks of falls, fractures, or frailty. This suggests that the musculoskeletal disorders frequently reported in MS patients in clinical studies are more likely attributed to secondary factors associated with disease progression and treatment, rather than being directly caused by MS itself.

Language: en

Keywords: Falls; Fracture; Frailty; Mendelian randomization; Multiple sclerosis

Exploring factors associated with falls in multiple sclerosis: insights from a scoping review

Kaddoura R, Faraji H, Othman M, Abu Hijleh A, Loney T, Goswami N, Benamer HTS. Clin. Interv. Aging 2024; 19: 923-938.

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Abstract

Multiple sclerosis (MS) is a chronic inflammatory condition that causes demyelination of the central nervous system accompanied by a wide range of symptoms. The high prevalence of falls among patients diagnosed with MS within the initial six months highlights the importance of this issue. The objective of this study is to identify factors associated with falls in MS patients in order to increase awareness and reduce the risk of falls. This scoping review used specific Mesh terms to formulate the literature search around falls and MS using Medline, Google Scholar, Scopus, and Embase search engines. English papers published between 2012 and 2022, studies with a clear definition of falls, McDonald's diagnostic criteria for MS, and those with Expanded Disability Status Scale (EDSS) or Patient Determined Disease Steps (PDDS) scores were included. Critical data from the selected articles were extracted and classified according to the different factors associated with falls in MS patients. Eighteen articles were included in this review. The most important factors associated with falls in MS patients identified were the severity and progression of the disease, mobility and balance problems, bladder dysfunction, fear of falling, fatigue, and cognitive dysfunction. In conclusion, this scoping review yielded the most common factors associated with falls in patients with MS. Study findings can be used to develop future interventions focusing on improving mobility, proprioception, and balance to decrease fall risk and injury amongst MS patients.

Language: en

Keywords: *Accidental Falls/statistics & numerical data/prevention & control; *Multiple Sclerosis/complications; *Postural Balance; causes; Cognitive Dysfunction/epidemiology; Disease Progression; falls; Fatigue/epidemiology; Fear; Humans; multiple sclerosis; neurological disorders; risk factors; Risk Factors; Severity of Illness Index

Effectiveness of dance interventions for falls prevention in older adults: systematic review and meta-analysis

Lazo Green K, Yang Y, Abaraogu U, Eastaugh CH, Beyer FR, Norman G, Todd C. Age Ageing 2024; 53(5).

(Copyright © 2024, Oxford University Press)

DOI: 10.1093/ageing/afae104
PMC11110915

PMID: 38776214 PMCID:

Abstract

INTRODUCTION: Fall prevention is a global health priority. Strength and balance exercise programmes are effective at reducing falls. Emerging literature suggests dance is an enjoyable and sociable form of exercise. However, there is little evidence that dance reduces fall incidence.

METHODS: Systematic review and meta-analysis examining effectiveness and cost-effectiveness of dance for falls prevention in older adults. Five databases were searched with no restrictions on publication date or intervention settings. Risk of bias was assessed using variants of Cochrane Risk of bias tools, Mixed-Methods Appraisal and Drummond checklist as appropriate. Certainty of evidence was assessed using GRADE.

RESULTS: Forty-one studies were included (19 RCTs, 13 quasi-experimental, two mixed-method, seven observational studies, 2,451 participants). Five types of dance interventions were identified: ballroom and Latin dance, dance exercise, cultural dance, dance therapy, and low-impact dance. Meta-analysis was only possible for functional outcome measures: Timed-Up-and-Go (dance versus usual care, mean difference (MD) = 1.36; 95% CI -3.57 to 0.85), Sit-to-Stand (dance versus exercise MD = -0.85; 95% CI -2.64 to 0.93; dance versus education MD = -1.64; 95% CI -4.12 to 0.85), Berg Balance Scale (dance versus usual care MD = 0.61; 95% CI -4.26 to 5.47). There was unexplained variance in effects and no significant differences between intervention and control groups. Overall, certainty of evidence was very low; we are uncertain about the effect of dance interventions in reducing falls.

CONCLUSIONS: There is very low certainty evidence for dance as an alternative to strength and balance training if the aim is to prevent falls. No robust evidence on the cost-effectiveness of dance interventions for the prevention of falls was found. PROSPERO REGISTRATION: CRD42022382908.

Language: en

Keywords: Humans; Risk Factors; Aged; Female; Male; systematic review; Age Factors; Aged, 80 and over; Treatment Outcome; older adults; older people; falls; *Accidental Falls/prevention & control; *Cost-Benefit Analysis; *Dance Therapy/methods; *Dancing; community-dwelling older adults; dance interventions; falls prevention; Postural Balance

Incidence and factors associated with falls in older people in a long-term care facility: a prospective study in Taiwan

Lee HC, Hsieh CJ, Jerng JS. *Healthcare (Basel)* 2024; 12(10).

(Copyright © 2024, MDPI: Multidisciplinary Digital Publishing Institute)

DOI: 10.3390/healthcare12100959

PMID: 38786371

PMCID: PMC11121478

Abstract

BACKGROUND: The effectiveness of applying a fall-risk assessment to prevent falls in residents of long-term care facilities has not been investigated.

METHODS: This prospective study enrolled elderly residents in a long-term care facility in Taiwan. Caregivers were provided with a health-status assessment and fall-risk data to enhance their fall-prevention practices. A multivariate analysis was performed to identify the factors associated with falls.

RESULTS: A total of 123 subjects, including 68 and 55 for general and nursing-care models, respectively, were assessed. Their health status and risk of falls were provided to the care units to enhance their fall-prevention practices. Subjects in the nursing-care model had more dementia and more prescribed medications, worse physiologic conditions, and higher fall risk. Of them, 28 (23%) had subsequent falls. A univariate analysis showed that those with and without falls were similar in demographic characteristics, prescribed medications, physiologic function, and fall risk. There was a tendency for more falls in the nursing-care model residents (accounting for 61% of those who fell; $p = 0.053$). A regression analysis showed that gender (beta = 1.359; 95% confidence interval = 0.345-2.374; $p = 0.010$) and NPI score (beta = 0.101; 95% CI = 0.001-0.200; $p = 0.047$) were associated with the risk of falls.

CONCLUSION: Residents at the long-term care facility had a significant risk of falls despite knowledge of their fall risk and the implementation of preventive measures. In this context of being aware of the risk, gender, and psychiatric symptoms were significantly associated with falls. Caregivers at long-term care facilities should implement further measures to prevent falls based on behavioral and psychological symptoms.

Language: en

Keywords: fall; institutional resident; risk factor

Factors impacting fall severity in hospitalized patients: a retrospective cohort study

Liu SY, Yang YK, Kor CT, Sun YW, Wang HY, Yang YT, Chou MC. *J. Clin. Med.* 2024; 13(10): e2827.

(Copyright © 2024, MDPI: Multidisciplinary Digital Publishing Institute)

DOI: 10.3390/jcm13102827

PMID: 38792368

Abstract

OBJECTIVES: This retrospective case-controlled study aimed to evaluate the association between the severity of fall-related injuries and fall-risk-increasing drugs (FRIDs) in hospitalized patients.

METHODS: Data were collected from Changhua Christian Hospital, Taiwan, of all adult inpatients who experienced falls between January 2017 and December 2021, and were divided into two groups based on whether they sustained severe fall-related injuries. Retrospective data that may affect the severity of fall-related injuries and the use of FRIDs were investigated.

RESULTS: Among 1231 documented cases of falls, 26 patients sustained severe fall-related injuries. Older patients and those with osteoporosis were more susceptible to more severe injuries from a fall. The use of mobility aids and osteoporosis medications showed protective effects against fall injuries. No significant association was observed between fall-related injuries and comorbidities or FRIDs. Multivariate analysis confirmed the inverse correlation between the use of mobility aids, osteoporosis medications, and fall severity. Patients with osteoporosis exhibited significantly higher odds of sustaining more severe injuries with a fall (odds ratio = 3.02, 95% confidence interval: 1.21-7.53).

CONCLUSIONS: This study highlights the importance of addressing risk factors associated with fall severity among hospitalized patients. Providing mobility aids to persons at greater risk.

Language: en

Keywords: fall-risk-increasing drugs (FRIDs); hospitalized patients; severity of fall

Scientometric research and critical analysis of gait and balance in older adults

Mao Q, Zheng W, Shi M, Yang F. *Sensors* (Basel) 2024; 24(10): e3199.

(Copyright © 2024, MDPI: Multidisciplinary Digital Publishing Institute)

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Abstract

Gait and balance have emerged as a critical area of research in health technology. Gait and balance studies have been affected by the researchers' slow follow-up of research advances due to the absence of visual inspection of the study literature across decades. This study uses advanced search methods to analyse the literature on gait and balance in older adults from 1993 to 2022 in the Web of Science (WoS) database to gain a better understanding of the current status and trends in the field for the first time. The study analysed 4484 academic publications including journal articles and conference proceedings on gait and balance in older adults. Bibliometric analysis methods were applied to examine the publication year, number of publications, discipline distribution, journal distribution, research institutions, application fields, test methods, analysis theories, and influencing factors in the field of gait and balance. The results indicate that the publication of relevant research documents has been steadily increasing from 1993 to 2022. The United States (US) exhibits the highest number of publications with 1742 articles. The keyword "elderly person" exhibits a strong citation burst strength of 18.04, indicating a significant focus on research related to the health of older adults. With a burst factor of 20.46, Harvard University has made impressive strides in the subject. The University of Pittsburgh displayed high research skills in the area of gait and balance with a burst factor of 7.7 and a publication count of 103. The research on gait and balance mainly focuses on physical performance evaluation approaches, and the primary study methods include experimental investigations, computational modelling, and observational studies. The field of gait and balance research is increasingly intertwined with computer science and artificial intelligence (AI), paving the way for intelligent monitoring of gait and balance in the elderly. Moving forward, the future of gait and balance research is anticipated to highlight the importance of multidisciplinary collaboration, intelligence-driven approaches, and advanced visualization techniques.

Language: en

Keywords: *Bibliometrics; *Gait/physiology; *Postural Balance/physiology; Aged; clustering analysis; gait and balance; global ageing; Humans; interrelated literature research; scientometric method

Cross-sectional study of prevalence and correlates of fear of falling in the older people in residential care in India: the Hyderabad Ocular Morbidity in Elderly Study (HOMES)

Marmamula S, Kumbham TR, Modepalli SB, Barrenkala NR, Keeffe JE, Friedman DS. *BMJ Open* 2024; 14(5): e080973.

(Copyright © 2024, BMJ Publishing Group)

DOI: 10.1136/bmjopen-2023-080973

PMID: 38806424

Abstract

OBJECTIVE: To report the prevalence and risk factors for the fear of falling (FOF) among older individuals living in residential care facilities in India.

DESIGN: Cross-sectional study. **SETTING:** Homes for the aged centres in Hyderabad, India.

PARTICIPANTS: The study included individuals aged ≥ 60 years from homes for the aged centres. The participants underwent a comprehensive eye examination in make-shift clinics setup in homes. Trained investigators collected the personal and demographic information of the participants and administered the Patient Health Questionnaire-9 and Hearing Handicap Inventory for Elderly questionnaire in the vernacular language. FOF was assessed using the Short Falls Efficacy Scale. The presence of hearing and visual impairment in the same individual was considered dual sensory impairment (DSI). A multiple logistic regression analysis was done to assess the factors associated with FOF. **PRIMARY OUTCOME MEASURE:** FOF.

RESULTS: In total, 867 participants were included from 41 homes for the aged centres in the analyses. The mean (\pm SD) age of the participants was 74.2 (\pm 8.3) years (range 60-96 years). The prevalence of FOF was 56.1% (95% CI 52.7% to 59.4%; n=486). The multivariate analysis showed that those with DSI had eleven times higher odds of reporting FOF than those with no impairment (OR 11.14; 95% CI 3.15 to 41.4.) Similarly, those with moderate depression had seven times higher odds (OR 6.85; 95% CI 3.70 to 12.70), and those with severe depression had eight times higher odds (OR 8.13; 95% CI 3.50 to 18.90) of reporting FOF. A history of falls in the last year was also associated with increased odds for FOF (OR 1.52; 95% CI 1.03 to 2.26).

CONCLUSION: FOF is common among older individuals in residential care in India. Depression, falling in the previous year and DSI were strongly associated with FOF. A cross-disciplinary approach may be required to address FOF among the older people in residential care in India.

Language: en

Keywords: *Accidental Falls/statistics & numerical data; *Fear/psychology; *Homes for the Aged; Aged; Aged, 80 and over; aging; Cross-Sectional Studies; epidemiology; Female; geriatric medicine; Humans; India/epidemiology; Logistic Models;

Male; Middle Aged; Prevalence; public health; Risk Factors; Surveys and Questionnaires;
Vision Disorders/epidemiology/psychology

Unveiling fall triggers in older adults: a machine learning graphical model analysis

Nguyen T, Thiamwong L, Lou Q, Xie R. *Mathematics (Basel)* 2024; 12(9): e1271.

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DOI: 10.3390/math12091271

PMID: 38784721

PMCID: PMC11113328

Abstract

While existing research has identified diverse fall risk factors in adults aged 60 and older across various areas, comprehensively examining the interrelationships between all factors can enhance our knowledge of complex mechanisms and ultimately prevent falls. This study employs a novel approach—a mixed undirected graphical model (MUGM)—to unravel the interplay between sociodemographics, mental well-being, body composition, self-assessed and performance-based fall risk assessments, and physical activity patterns. Using a parameterized joint probability density, MUGMs specify the higher-order dependence structure and reveals the underlying graphical structure of heterogeneous variables. The MUGM consisting of mixed types of variables (continuous and categorical) has versatile applications that provide innovative and practical insights, as it is equipped to transcend the limitations of traditional correlation analysis and uncover sophisticated interactions within a high-dimensional data set. Our study included 120 elders from central Florida whose 37 fall risk factors were analyzed using an MUGM. Among the identified features, 34 exhibited pairwise relationships, while COVID-19-related factors and housing composition remained conditionally independent from all others. The results from our study serve as a foundational exploration, and future research investigating the longitudinal aspects of these features plays a pivotal role in enhancing our knowledge of the dynamics contributing to fall prevention in this population.

Language: en

Keywords: 62-08; aging research; correlation analysis; fall risks; machine learning; mixed graphical models; older adults; undirected graphical models

Healthcare professionals' insights regarding the applicability of the STEADI falls prevention program among neurology patients: a qualitative study

Rababah JA, Al-Hammouri MM, Alsaqer HH. *J. Multidiscip. Healthc.* 2024; 17: 2591-2599.

(Copyright © 2024, Dove Press)

DOI: 10.2147/JMDH.S463667

PMID: 38803619

PMCID: PMC11129749

Abstract

AIM: Falls are common among hospitalized patients especially those with neurological health conditions. This highlights the need to implement evidence-based, comprehensive fall prevention programs. However, certain barriers hinder successful implementation of fall prevention programs in hospitals. The aim of this study was to explore the insights of healthcare professionals regarding the implementation of an interdisciplinary falls prevention program among patients with neurological health conditions.

METHODS: A qualitative, descriptive design was used to conduct this study. Healthcare providers at two neurology units from two hospitals were invited to attend interdisciplinary workshops on fall prevention using the Stopping Elderly Accidents, Deaths, and Injuries (STEADI) program. Reflective journals were used to collect the data. A total of 23 healthcare providers returned their completed journals and thematic analysis was performed to extract the main themes.

FINDINGS: Thematic analysis revealed a total of four main themes: (1) The STEADI program provides an interdisciplinary approach to identifying fall risks, (2) The STEADI program improves patient safety and facilitates recovery, (3) The STEADI program fails to accommodate all neurology patients, and (4) Time and space constraints hinder success.

CONCLUSION: Responses to the reflective journals revealed that the participants were able to identify the advantages of using the STEADI program for both healthcare professionals and patients with neurological conditions. The comprehensive and evidence-based approach, coupled with its interdisciplinary nature, was highly appraised by the participants.

Language: en

Keywords: falls; falls prevention; interdisciplinary care; neurology; neurosurgery; qualitative research

A machine learning approach to evaluate the impact of virtual balance/cognitive training on fall risk in older women

Sokołowska B, Świdorski W, Smolis-Bąk E, Sokołowska E, Sadura-Siekłucka T. *Front. Comput. Neurosci.* 2024; 18: e1390208.

(Copyright © 2024, Frontiers Research Foundation)

DOI: 10.3389/fncom.2024.1390208

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PMCID: PMC11130377

Abstract

INTRODUCTION: Novel technologies based on virtual reality (VR) are creating attractive virtual environments with high ecological value, used both in basic/clinical neuroscience and modern medical practice. The study aimed to evaluate the effects of VR-based training in an elderly population.

MATERIALS AND METHODS: The study included 36 women over the age of 60, who were randomly divided into two groups subjected to balance-strength and balance-cognitive training. The research applied both conventional clinical tests, such as (a) the Timed Up and Go test, (b) the five-times sit-to-stand test, and (c) the posturographic exam with the Romberg test with eyes open and closed. Training in both groups was conducted for 10 sessions and embraced exercises on a bicycle ergometer and exercises using non-immersive VR created by the ActivLife platform. Machine learning methods with a k-nearest neighbors classifier, which are very effective and popular, were proposed to statistically evaluate the differences in training effects in the two groups.

RESULTS AND CONCLUSION: The study showed that training using VR brought beneficial improvement in clinical tests and changes in the pattern of posturographic trajectories were observed. An important finding of the research was a statistically significant reduction in the risk of falls in the study population. The use of virtual environments in exercise/training has great potential in promoting healthy aging and preventing balance loss and falls among seniors.

Language: en

Keywords: aging; virtual reality; machine learning; fall risk; balance and cognitive training; body balance; k-NN algorithm; postural stability

Commentary on: "Generalization of In-Place Balance Perturbation Training in People With Parkinson Disease"

Studer M, Jacobson K. J. Neurol. Phys. Ther. 2024; ePub(ePub): ePub.

(Copyright © 2024, Neurology Section, American Physical Therapy Association)

DOI: 10.1097/NPT.0000000000000484 **PMID:** 38797879

Abstract

No abstract was provided. However, the first page of this article is available by following the DOI.

Language: en

Hamstrings-quadriiceps strength ratio could be related to falls in community-living older adults

Yang F, Simpkins C, Trammell AR, Pagnussat AS. *J. Electromyogr. Kinesiol.* 2024; 77: e102900.

(Copyright © 2024, Elsevier Publishing)

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PMID: 38810416

Abstract

A prior study reported that the concentric strength imbalance between hamstrings and quadriceps is associated with falls in older adults. Given that the concentric strength may not be measured as conveniently as the isometric strength, it is meaningful to test whether the isometric hamstring-quadriiceps strength imbalance is related to falls among older adults. This study sought to explore whether the hamstrings-quadriiceps ratio could differentiate fallers from non-fallers in community-dwelling older adults. One hundred and eleven older adults were included in this cross-sectional study. Their isometric knee joint strength capacity (extensors and flexors) was measured. Based on their fall history in the past year, they were classified as fallers (at least one fall) or non-fallers (no fall). The hamstrings-quadriiceps ratio was compared between the faller and non-faller groups. The receiver operating characteristic analysis was used to determine the cutoff value of the hamstrings-quadriiceps ratio able to best classify fallers and non-fallers. Fallers showed a significantly lower hamstrings-quadriiceps ratio than non-fallers ($p = 0.008$). The receiver operating characteristic analysis identified 0.733 as the best ratio to differentiate fallers from non-fallers with an accuracy of 64.0 %. A 0.1-unit reduction in the hamstrings-quadriiceps ratio increases the probability of falling by a factor of 1.30. The hamstrings-quadriiceps ratio could be used as an additional fall risk factor when assessing the risk of falls among older adults. A smaller than 0.733 hamstring-quadriiceps ratio may indicate a high risk of falls.

Language: en

Keywords: Fall prevention; Fall risk assessment; Isometric strength; Strength imbalance