

The Modified Five-Item Frailty Index, mortality, and hospital length of stay in geriatric traumatic fall injuries

Antonson D, Bromberg J, Lueckel S, Mello MJ. R. I. Med. J. (2013) 2024; 107(8): 8-11.

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DOI: unavailable

PMID: 39058983

Abstract

This study investigates the association between frailty, measured by the modified five-item frailty index (mFI-5), with inpatient mortality and hospital length of stay for geriatric patients with fall-related injuries. Despite falls being major contributors to morbidity and mortality in those over 65, the interaction between frailty and post-fall outcomes remains underexplored. Data for patients aged 65 and above, admitted between 2014-2020 to Rhode Island Hospital's trauma service for fall-related injuries, were extracted from its Trauma Registry. Frailty scores were retrospectively assigned using mFI-5. Logistic- and linear-regression analyses examined the relationship between mFI-5 scores, mortality, and hospital length-of-stay. Among 6,782 patients (mean age: 81.7 ± 8.66 years), higher frailty scores correlated with increased inpatient mortality (OR: 1.259; 95% CI: 1.14-1.39; $P < 0.000$) and longer hospital stays (Coeff.: 0.460; 95% CI: 0.35-0.57, $P < 0.000$). Notably, age showed a negative association with hospital length of stay but no significant association with inpatient mortality.

Language: en

Keywords: Humans; Aged; Female; Male; Retrospective Studies; Aged, 80 and over; geriatrics; falls; frailty; *Accidental Falls/statistics & numerical data/mortality; *Frailty/mortality; *Hospital Mortality; *Length of Stay/statistics & numerical data; Frail Elderly/statistics & numerical data; Geriatric Assessment; modified five-item frailty index (mFI-5); Rhode Island/epidemiology; Wounds and Injuries/mortality

A walking aid selection, training, and education program (ADSTEP) to prevent falls in multiple sclerosis: a randomized controlled trial

Cameron MH, Hildebrand A, Hugos C, Wooliscroft L. *Mult. Scler.* 2024; ePub(ePub): ePub.

(Copyright © 2024, SAGE Publishing)

DOI: 10.1177/13524585241265031

PMID: 39104170

Abstract

BACKGROUND: People with multiple sclerosis (MS) fall frequently. Poor walking aid selection, fit, and use contribute to falls in those who use walking aids.

OBJECTIVES: To determine if the Assistive Device Selection, Training, and Education Program (ADSTEP), with six weekly one-on-one virtual sessions with a physical therapist prevents falls and improves other outcomes in people with MS who use walking aids but still fall.

METHODS: A total of 78 people were randomized to ADSTEP or control. Participants recorded falls daily through 6 months post-intervention. Other outcomes were assessed at baseline, intervention completion, and 6 months later. Outcomes were compared between groups.

RESULTS: The ADSTEP group's mean fall rate (falls/person/month) decreased from baseline to intervention completion (ADSTEP = -0.75, control = +0.90, $p < 0.001$) and to 6 months later (ADSTEP = -1.02, control = +0.03, $p = 0.017$) compared to controls. At 6 months, the ADSTEP group had improved physical activity (days/week walking ≥ 10 minutes at a time: ADSTEP = +0.69, control = -0.58, $p = 0.007$; minutes/day sitting: ADSTEP = -57, control = +56, $p = 0.009$) and walking aid fit (proportion with good fit: ADSTEP = +25%, control = -13%, $p = 0.018$) compared to controls.

CONCLUSIONS: ADSTEP likely reduces falls, increases physical activity, and improves walking aid fit in people with MS who use walking aids and fell in the past year.

Language: en

Keywords: randomized controlled trial; physical therapy; falls; Multiple sclerosis; rehabilitation; walking aids

Postural balance and body mass index in older adults; a descriptive and associative study testing traditional risk factors

Caparrós-Manosalva C, Marzuca-Nassr GN, Muñoz-Mendoza CL, Espinoza-Araneda J, Bravo-Carrasco V, Muñoz J, Alvarez C. Rev. Med. Chile 2023; 151(7): 813-822.

(Copyright © 2023, Sociedad Medica De Santiago)

DOI: 10.4067/s0034-98872023000700813

PMID: 39093170

Abstract

BACKGROUND: There is a scarcity of information about how much the postural balance parameters, as the area and mean velocity of the center of pressure (CoP), can be modified by traditionally adiposity markers in older adults.

OBJECTIVES: To describe and associate postural balance parameters in Chilean older adults with different BMI. A second objective was to associate the area of balance with weight.

METHODS: In a descriptive study, Chilean older adults (mean age; 70 ± 1.0 , BMI 29.0 ± 0.4 kg/m²) were categorized by a normoweight control group (CG, n = 7, BMI; 23.1 ± 0.5), overweight (OvW, n = 41, BMI; 27.6 ± 0.2), and obesity (Ob, n = 23, BMI; 34.2 ± 0.5). The subjects were evaluated on a stable/hard [HS]/soft [SS] surface, and under open [OE]/ closed [CE] eyes. Secondary outcomes were weight, height, BMI, and functional health. Univariate test and linear regression were applied.

RESULTS: CoP mean velocity on the HS and CE, showed significant differences between CG vs. OvW groups (24.9 ± 7.4 mm/s vs. 12.1 ± 0.97 mm/s, $p < 0.0001$). There were significant differences in Romberg index between CG vs. OvW group ($176.7 \pm 16.4\%$ vs. $132.4 \pm 7.1\%$, $p = 0.002$), and between CG vs. Ob group ($176.7 \pm 16.4\%$ vs. $129.4 \pm 17.2\%$, $p = 0.005$). On the SS with OE, there were significant differences between CG vs. OvW groups (29.8 ± 4.8 mm/s vs. 18.6 ± 1.2 mm/s, $p < 0.003$), and, on the SS, with CE, between CG vs. OvW groups (41.5 ± 31.2 mm/s vs. 24.6 ± 15.2 mm/s, $p = 0.015$).

CONCLUSIONS: At higher BMI such as at overweight or obesity conditions, older adults show a reduced 'CoP mean velocity' than control normoweight peers', being 'weight' a traditional adiposity risk factor predictor of balance performance.

Language: en

Keywords: Humans; Cross-Sectional Studies; Risk Factors; Aged; Female; Male; Chile; Geriatric Assessment/methods; *Postural Balance/physiology; *Body Mass Index; *Obesity/physiopathology; Overweight/physiopathology

Balance board or motion capture? A meta-analysis exploring the effectiveness of commercially available virtual reality exergaming in enhancing balance and functional mobility among the elderly

Cieślak B, Wrzeciono A, Mazurek J, Federico S, Szczepańska-Gieracha J, Kiper P. Games Health J. 2024; ePub(ePub): ePub.

(Copyright © 2024, Mary Ann Liebert Publishers)

DOI: 10.1089/g4h.2023.0109

PMID: 39093844

Abstract

Force platforms and motion capture are commonly used as feedback mechanisms in exergaming; nevertheless, their therapeutic effectiveness may vary. Therefore, the primary objective of this study was to evaluate the effectiveness of commercially available virtual reality (VR) exergaming systems on balance and functional mobility, with a supplementary analysis considering the administered dose of exergaming. The search was conducted in five databases. Commercially available exergaming platforms were classified into two categories: VR exergaming with a balance board (including Wii Balance Board) and motion capture (including Xbox Kinect). Two categories of control interventions (treatment as usual [TAU] and no treatment [NT]) were extracted. The meta-analysis was performed separately for static, dynamic, and proactive balance outcomes and for the aggregated results of all included outcomes with subgroup analysis of lower, moderate, and higher doses. In total, 28 studies with 1457 participants were included. Both exergaming systems were particularly effective in improving the single leg stance outcome. VR exergaming with motion capture was found to be more effective than TAU with a standardized mean difference (SMD) of 0.48 ($P = 0.006$) and NT (SMD = 0.86; $P = 0.02$). In conclusion, commercially available VR exergaming with a motion capture feedback mechanism has demonstrated effectiveness as an intervention for balance training when compared with NT. Specifically, high doses (above 134 minutes per week) appear to be more beneficial for healthy older adults. Moreover, the findings provide some weak evidence supporting the effectiveness of VR exergaming with a balance board for improving functional mobility, particularly when compared with NT.

Language: en

Keywords: older adults; biofeedback; games; physiotherapy; postural stability; rehabilitation

Effects of pilates exercises on postural balance and reduced risk of falls in older adults: a systematic review and meta-analysis

de Campos Júnior JF, de Oliveira LC, Dos Reis AL, de Almeida LIM, Branco LV, de Oliveira RG. *Complement. Ther. Clin. Pract.* 2024; 57: e101888.

(Copyright © 2024, Elsevier Publishing)

DOI: 10.1016/j.ctcp.2024.101888

PMID: 39068875

Abstract

BACKGROUND: and Purpose: Pilates exercises have been recommended to improve postural balance and reduce the risk of falls in older adults. However, the certainty of these recommendations remains unclear. In this sense, our objective was to update the literature and verify the effects of Pilates on postural balance and the risk of falls in this population.

METHODS: A systematic search was conducted across multiple databases, including PubMed, EMBASE, CENTRAL, CINAHL, Web of Science, SPORTDiscus, LILACS, and PEDro, on April 17, 2023. The methodological quality of the studies was assessed using the PEDro scale, and the certainty of evidence was evaluated using the GRADE system. Meta-analysis calculations were performed by standardized mean difference (SMD).

RESULTS: A total of 39 studies, involving 1770 participants, were included in the systematic review. Only 14 studies exhibited satisfactory methodological quality. Evidence with very low to moderate certainty showed that Pilates was significantly superior to control groups on indicators of dynamic postural balance (SMD = 1.60 to 0.72), static postural balance (SMD = 0.37 to 0.25), and general state of balance (SMD = 0.76), but not to reduce the number and fear of falls. Furthermore, Pilates was comparable to other forms of exercise for these outcomes.

CONCLUSIONS: Pilates can be recommended to enhance static and dynamic postural balance in older adults, but not to reduce the number of falls or the fear of falling. Given that no outcomes showed high certainty of evidence, future studies may alter these findings.

Language: en

Keywords: Aged; Accidental falls; Exercise movement techniques; Postural control

Smartphone-based evaluation of static balance and mobility in type 2 Diabetes

Fernandes TF, Volpe MITC, Pena FPS, Santos EGR, Pinto GHL, Belgamo A, Costa E Silva AA, Cabral AS, Callegari B, Souza GS. An. Acad. Bras. Cienc. 2024; 96(Suppl 1): e20231244.

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DOI: 10.1590/0001-3765202420231244

PMID: 39082591

Abstract

It was compared smartphone-based measurements of static balance control and mobility of elderly population with and without type 2 diabetes mellitus (DM2). The present cross-sectional study investigated 73 participants grouped in a control group (n = 36) and a DM2 group (n = 37). Smartphone's built in inertial sensors were used to record inertial changes of the participants during static balance and mobility (Timed Up and Go test - TUG) tasks. The inertial variations as a function of the time were analyzed and compared between groups. Both groups were matched in age, body mass index, male-female proportion, but DM2 group had significant larger fasting glucose than control group. Additionally, DM2 group had worst static balance control with open and closed eyes than the controls ($p < 0.05$) as well as they also had longer duration to execute the different events of the mobility test than the controls ($p < 0.05$). DM2 patients had decline of motor functions compared to controls and the use of built-in sensors of smartphones was feasible to identify these functional impairments. The easy access of smartphones could be improving the screening of functional impairments in DM2 patients.

Language: en

Keywords: Humans; Cross-Sectional Studies; Aged; Female; Male; Middle Aged; Case-Control Studies; *Smartphone; *Postural Balance/physiology; *Diabetes Mellitus, Type 2/physiopathology

Sarcopenia definitions and their association with injurious falls in older Swedish women from the Sahlgrenska University Hospital Prospective Evaluation of Risk of Bone fractures (SUPERB) study

Gandham A, Gregori G, Johansson L, Larsson BAM, Johansson H, Harvey NC, Vandenput L, McCloskey E, Kanis JA, Litsne H, Axelsson K, Lorentzon M. *Osteoporos. Int.* 2024; ePub(ePub): ePub.

(Copyright © 2024, Holtzbrinck Springer Nature Publishing Group)

DOI: 10.1007/s00198-024-07196-0

PMID: 39105786

Abstract

Associations between different sarcopenia definitions and the risk of injurious falls were investigated in 75-80-year-old women in the Swedish SUPERB cohort. Only sarcopenia according to the Sarcopenia Definitions and Outcomes Consortium (SDOC) definition was associated with incident injurious falls with and without fractures in older women.

PURPOSE: To investigate the association between three commonly used sarcopenia definitions and the risk of injurious falls in a population of older Swedish women.

METHODS: A total of 2,883 75-80-year-old women with complete data on relevant sarcopenia definitions from the Swedish SUPERB cohort were studied. Sarcopenia was defined based on the Sarcopenia Definitions and Outcomes Consortium (SDOC: low handgrip strength and gait speed), revised European Working Group on Sarcopenia in Older People (EWGSOP2: low appendicular lean mass index (ALMI, dual-energy X-ray absorptiometry (DXA)-derived), appendicular lean mass (kg)/height (m²), hand grip strength (kg), or low chair stand time (s)), and Asian Working Group for Sarcopenia (AWGS: low ALMI and hand grip strength (kg) or low gait speed (m/s)). Questionnaires captured the occurrence of falls in the past 12 months. Incident injurious falls were identified using national registers. Cox regression (hazard ratios (HR) and 95% confidence intervals (CI)) analyses were performed without adjustment and after adjustment for age, body mass index, previous falls, and the Charlson comorbidity index.

RESULTS: During a median (IQR) follow-up time of 7.06 (6.2-7.9) years, there were 491 injurious falls without fracture and 962 injurious falls when also including falls resulting in a fracture. Sarcopenia according to EWGSOP2 and AWGS was not associated with an increased risk of injurious falls. Individuals with sarcopenia defined by SDOC had a higher risk of injurious falls with and without fracture (HR 2.11; 95% CI, 1.63-2.73 and HR, 2.16; 95% CI, 1.55-3.02, respectively).

CONCLUSION: Sarcopenia definitions confined to muscle function and strength such as SDOC, rather than including DXA-determined ALMI (EWGSOP2 and AWGS), are associated with incident injurious falls with and without fractures in older women.

Language: en

SafetyLit 32
11 August 2024

Keywords: Older adults; Falls; Sarcopenia

Effects of virtual reality on the balance performance of older adults: a systematic review and meta-analysis

Huang WY, Chang ST, Lee CH, Liou IH, Cherng RJ. *J. Phys. Ther. Sci.* 2024; 36(8): 457-470.

(Copyright © 2024, Society of Physical Therapy Science)

DOI: 10.1589/jpts.36.457

PMID: 39092409

PMCID: PMC11290862

Abstract

[Purpose] Virtual reality has been increasingly used to improve the balance performance of older adults; however, the effect remains inconclusive. This study aimed to examine the effects of virtual reality on the balance performance of older adults through a systematic review and meta-analysis. [Methods] The PubMed, MEDLINE, CINAHL, Cochrane Library, and PEDro electronic databases were searched. Only randomized clinical trials published in English from January 1st, 1980, to September 30, 2022, were included and reviewed. Outcome measures included the Berg Balance Scale, Timed Up and Go Test and Activity-specific Balance Confidence scale. [Results] The results showed that virtual reality training for older adults led to significant improvements in Berg Balance Scale scores and Timed Up and Go Test times compared with non-virtual reality training. However, such an outcome was not observed with regard to the Activity-specific Balance Confidence scale. [Conclusion] Virtual reality training is effective in improving both static and dynamic balance among older adults. However, its effect on their self-confidence regarding balance is not significant.

Language: en

Keywords: Older adults; Virtual reality; Balance performance

Addressing equity gaps in fall-related injuries

Ivers R, Ryder C, Shannon B. *Lancet Public Health* 2024; 9(8): e534-e535.

(Copyright © 2024, Elsevier Publishing)

DOI: 10.1016/S2468-2667(24)00155-5

PMID: 39095130

Abstract

Falls cause a major burden of death and disability globally, but the burden is not equitably distributed: while the age-standardised incidence of injuries from falls declined from 1990 to 2017 in high Socio-demographic Index quintiles, incidence increased in the low-income and middle-income quintiles.¹

This pattern, however, is not surprising, given that falls--like many other injuries--are partly driven by social determinants of health, leading to gross inequities. Poor-quality housing, inadequate workplace safety, systemic and institutional racism, and the absence of standards for consumer product safety are all factors that contribute to the incidence of falls in resource-constrained settings worldwide. Recognising this substantial and inequitable burden, in 2021, WHO's Step Safely technical package was published to provide global guidance on fall prevention strategies.²

Internationally, there is a large body of research focused on building knowledge on the burden of and risk factors for falls in older people, but much less research exists on this burden across the lifecourse. In *The Lancet Public Health*, the GBD US Health Disparities Collaborators³

provide unique detail on fall mortality in US populations by race and ethnicity. With a focus on examining disparities, the research provides a county-level, time-series analysis of fall-related mortality stratified by race and ethnicity.

Unsurprisingly, the results reveal that older people had the highest rates of mortality due to falls and the largest increases in fall-related mortality over time.³

Falls in older people are major drivers of morbidity and mortality globally and, with rapidly ageing populations worldwide, implementing appropriate prevention measures is essential to curtailing burgeoning injuries and health-care costs. ...

Language: en

Keywords: Humans; Health Status Disparities; *Accidental Falls/prevention & control; *Health Equity; Wounds and Injuries/prevention & control/epidemiology

Association of fear of falling with performance-based physical function and low back pain in older adults: a cross-sectional study in Iran

Khodadadi Z, ShahAli S, Hejazi A, Shanbehzadeh S. *BMJ Open* 2024; 14(8): e086970.

(Copyright © 2024, BMJ Publishing Group)

DOI: 10.1136/bmjopen-2024-086970

PMID: 39107012

Abstract

OBJECTIVES: This study investigated the association of fear of falling with performance-based physical function and low back pain (LBP) among older adults.

DESIGN: Cross-sectional study. **SETTING:** Participants were selected via convenient sampling from Iran University orthopaedic and/or physiotherapy outpatient clinics, between March 2022 and April 2023. **PARTICIPANTS:** 140 subjects with and without LBP, aged over 60 years, were included. **OUTCOME MEASURES:** The Falls Efficacy Scale International was used to measure fear of falling. A baseline questionnaire inquired about LBP. Participants performed the Timed Up and Go, 30 s Sit-To-Stand (30s-STs), single leg stance with open and closed eyes and gait speed tests to assess performance-based physical function. Demographic variables including age, gender and body mass index were considered as potential covariates. Bivariate and multivariable linear regression analyses were used to investigate the associations.

RESULTS: A significant association between fear of falling and the 30s-STs test score ($\beta=-0.30$, 95% CI -1.27 to -0.28; $p=0.00$) and the sex ($\beta=0.31$, 95% CI 1.53 to 4.83; $p=0.00$) was confirmed in multivariable analyses. LBP and other performance-based physical function tests were not associated with a fear of falling.

CONCLUSION: Fear of falling was significantly associated with lower extremity muscle function, measured by the 30s-STs test and female gender. Older adults with a fear of falling could benefit from interventions that improve lower extremity muscle function. Also, the observed association between the fear of falling and the female sex confirms the need for effective interventions to reduce the fear of falling among older women.

Language: en

Keywords: Humans; Cross-Sectional Studies; Aged; Female; Male; Middle Aged; Aged, 80 and over; Iran; aged; *Accidental Falls/statistics & numerical data; *Fear/psychology; *Low Back Pain/psychology/physiopathology; *Physical Functional Performance; back pain; cross-sectional studies; rehabilitation medicine

Objective falls risk assessment using markerless motion capture and representational machine learning

Maudsley-Barton S, Yap MH. Sensors (Basel) 2024; 24(14).

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

DOI: 10.3390/s24144593

PMID: 39065991

PMCID: PMC11280504

Abstract

Falls are a major issue for those over the age of 65 years worldwide.

OBJECTIVE assessment of fall risk is rare in clinical practice. The most common methods of assessment are time-consuming observational tests (clinical tests). Computer-aided diagnosis could be a great help. A popular clinical test for fall risk is the five times sit-to-stand. The time taken to complete the test is the most commonly used metric to identify the most at-risk patients. However, tracking the movement of skeletal joints can provide much richer insights. We use markerless motion capture, allied with a representational model, to identify those at risk of falls. Our method uses an LSTM autoencoder to derive a distance measure. Using this measure, we introduce a new scoring system, allowing individuals with differing falls risks to be placed on a continuous scale. Evaluating our method on the KINECAL dataset, we achieved an accuracy of 0.84 in identifying those at elevated falls risk. In addition to identifying potential fallers, our method could find applications in rehabilitation. This aligns with the goals of the KINECAL Dataset. KINECAL contains the recordings of 90 individuals undertaking 11 movements used in clinical assessments. KINECAL is labelled to disambiguate age-related decline and falls risk.

Language: en

Keywords: Humans; Aged; Female; Male; Aged, 80 and over; *Accidental Falls/prevention & control; *Machine Learning; anomaly detection; computer-aided diagnosis; falls risk; LSTM autoencoder; markerless motion capture; Motion Capture; Movement/physiology; representational model; Risk Assessment/methods

Multimorbidity patterns and the risk of falls among older adults: a community-based study in China

Nie XY, Dong XX, Lu H, Li DL, Zhao CH, Huang Y, Pan CW. BMC Geriatr. 2024; 24(1): e660.

(Copyright © 2024, Holtzbrinck Springer Nature Publishing Group - BMC)

DOI: 10.1186/s12877-024-05245-1

PMID: 39112944

Abstract

BACKGROUND: Due to the high prevalence of multimorbidity and realistic health service demands for fall prevention, there is growing interest in the association between multimorbidity and falls. Our study aimed to identify multimorbidity patterns among Chinese older adults and explore the association between multimorbidity patterns and falls.

METHODS: Data from 4,579 Chinese community-dwelling older adults was included in this analysis. Information regarding falls and 10 chronic conditions was collected. An exploratory factor analysis was performed to determine multimorbidity patterns. Regression models were fitted to explore the associations of individual chronic disease or multimorbidity patterns with falls.

RESULTS: Among 4,579 participants, 368 (8.0%) were defined as fallers, including 92 (2.0%) frequent fallers, and multimorbidity affected 2,503 (54.7%) participants. Older adults with multimorbidity were more likely to be fallers [odds ratio (OR) = 1.3, P = 0.02] and frequent fallers (OR = 1.7, P = 0.04). Three multimorbidity patterns were identified (i.e., cardiovascular-metabolic diseases, psycho-cognitive diseases and organic diseases), and the associations between psycho-cognitive diseases/organic diseases and prevalent falls or frequent falls were found to be significant.

CONCLUSIONS: The psycho-cognitive disease pattern and organic disease pattern are significantly associated with falls. Therefore, more attention should be paid to patients with psycho-cognitive diseases and timely, targeted diagnostic and treatment services should be provided in fall prevention.

Language: en

Keywords: Humans; Cross-Sectional Studies; Risk Factors; Aged; Female; Male; Aged, 80 and over; Older adults; China; Patterns; China/epidemiology; *Accidental Falls/prevention & control; Falls; *Independent Living/trends; *Multimorbidity/trends; Chronic Disease/epidemiology; Multimorbidity

Effects of frailty syndrome on osteoporosis, focusing on the mediating effect of muscle strength and balance in community-dwelling older adults (≥ 60 years) in Iran: results From the Amirkola Health and Aging Project Cohort Study

Shamsalinia A, Hosseini SR, Bijani A, Ghadimi R, Kordbageri MR, Saadati K, Ghaffari F. *Geriatr Orthop Surg Rehabil* 2024; 15: e21514593241264647.

(Copyright © 2024, SAGE Publishing)

DOI: 10.1177/21514593241264647

PMID: 39070931

PMCID: PMC11273585

Abstract

INTRODUCTION: For older adults, maintaining muscle strength and balance is crucial to preserve an upright posture and independently manage their basic activities of daily living (ADL). This study aimed to examine whether muscle strength and balance mediate the relationship between frailty syndrome (FS) and osteoporosis in a large sample of community-dwelling older adults. **MATERIAL AND METHODS:** This cross-sectional study is part of the second phase (2016-2017) of the Amirkola Health and Ageing Project (AHAP), a cohort study conducted on all elderly aged 60 and over in Amirkola, Northern Iran, since 2011. Data from 2018 older adults were collected by a trained person using bone mineral density (BMD), frailty index, activities of daily living (ADL), instrumental activities of daily living (IADL), handgrip strength (HGS), quadriceps muscle strength (QMS), Berg Balance Scale (BBS), and Timed Up and Go test (TUG test) and analyzed using analysis of variance, chi-square, and path analysis tests.

RESULTS: The mean indices of femoral neck BMD and lumbar spine BMD, HGS, QMS, BBS, ADL, and IADL were lower in the frail older adults than in the pre-frail and non-frail older adults. In addition, the mean TUG test level was higher in the frail older adults than in the non-frail and pre-frail older adults. The results of the present study have indicated that frailty is significantly related to osteoporosis, and that balance and muscle strength can predict osteoporosis; these variables play a mediating role in the relationship between frailty and osteoporosis.

CONCLUSION: From the results of the present study, it can be concluded that frailty may increase the odds of osteoporosis. The results of the current study have indicated that balance (BBS and TUG test) and muscle strength (HGS and QMS) are associated with osteoporosis and these variables play a mediating role in the relationship between frailty and osteoporosis.

Language: en

Keywords: older adult; muscle strength; balance; osteoporosis; bone mineral density; frailty syndrome

A case management strategy to reduce falls in older people with a history of falls: a randomized controlled trial

Sossai MI, Pantoni CBF, Gramani-Say K, de Melo ML, Maciel LT, Lord SR, Ansai JH. *Geriatr. Nurs.* 2024; 59: 301-305.

(Copyright © 2024, Elsevier Publishing)

DOI: 10.1016/j.gerinurse.2024.07.007 **PMID:** 39096584

Abstract

The present study aimed to determine whether a remotely delivered intervention, based on an individual case management, can reduce falls and their consequences in community-dwelling older people with a history of multiple falls. In this randomized controlled trial, 32 participants were randomized to the intervention group, which comprised a 16-week case management program involving a multidimensional assessment, targeted interventions according to the identified fall risk factors, and development of individualized care plans. The intervention was performed by trained gerontologists, under weekly supervision of professionals with experience in falls. The control group (n = 30) received usual care. Falls were monitored over 12 months with monthly falls calendars and telephone calls. Remotely delivered case management presented an 82 % uptake of recommendations. There was a trend toward a reduced fall incidence in the intervention vs control group, with lower fall, fall injury and fracture rates in the intervention group compared with the control group at both the 16-week and 12-month time-points, with the difference statistically significant for injurious fall rates at 12 months - IRR=0.18 (95 % CI = 0.04 to 0.74).

Language: en

Keywords: Aged; Accidental falls; Case management; Randomised controlled trial

Fall detection method for infrared videos based on spatial-temporal graph convolutional network

Yang J, He Y, Zhu J, Lv Z, Jin W. *Sensors* (Basel) 2024; 24(14).

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

DOI: 10.3390/s24144647

PMID: 39066046

PMCID: PMC11280873

Abstract

The timely detection of falls and alerting medical aid is critical for health monitoring in elderly individuals living alone. This paper mainly focuses on issues such as poor adaptability, privacy infringement, and low recognition accuracy associated with traditional visual sensor-based fall detection. We propose an infrared video-based fall detection method utilizing spatial-temporal graph convolutional networks (ST-GCNs) to address these challenges. Our method used fine-tuned AlphaPose to extract 2D human skeleton sequences from infrared videos. Subsequently, the skeleton data was represented in Cartesian and polar coordinates and processed through a two-stream ST-GCN to recognize fall behaviors promptly. To enhance the network's recognition capability for fall actions, we improved the adjacency matrix of graph convolutional units and introduced multi-scale temporal graph convolution units. To facilitate practical deployment, we optimized time window and network depth of the ST-GCN, striking a balance between model accuracy and speed. The experimental results on a proprietary infrared human action recognition dataset demonstrated that our proposed algorithm accurately identifies fall behaviors with the highest accuracy of 96%. Moreover, our algorithm performed robustly, identifying falls in both near-infrared and thermal-infrared videos.

Language: en

Keywords: Humans; *Algorithms; *Accidental Falls; *Infrared Rays; *Neural Networks, Computer; *Video Recording/methods; fall detection; infrared video; skeleton extraction; spatial-temporal graph convolutional network

Effectiveness of kneeling training in improving mobility and balance post-stroke

Zhang L, Yang J, Yang Q, An W, Wang D, Cui B. BMC Sports Sci. Med. Rehabil. 2024; 16(1): e163.

(Copyright © 2024, Holtzbrinck Springer Nature Publishing Group - BMC)

DOI: 10.1186/s13102-024-00953-y

PMID: 39095858

Abstract

BACKGROUND: Fall prevention and balance control constitute critical components of rehabilitation for stroke survivors. Kneeling training, characterized by its low center of gravity focus, has been incorporated into rehabilitation regimens to enhance postural control across various pathological conditions. Despite its widespread use, empirical evidence substantiating the efficacy of kneeling training is limited, particularly in the context of mobility and balance improvement for patients who have had a stroke. This study aims to substantiate the safety and effectiveness of kneeling training in individuals recovering from stroke.

METHODS: A randomized controlled trial comparing kneeling training and conventional rehabilitation training was conducted, involving sixty-seven participants allocated to the Kneeling Training Group (KNT) and the Conventional Rehabilitation Group (CVR). The KNT group underwent 30-minute sessions of kneeling training, while the CVR group received conventional treadmill walking training, both administered six times per week over four weeks. Evaluation encompassed the Fugl-Meyer Assessment for Lower Extremity (FMA-LE), the Berg Balance Scale (BBS), and gait analysis was conducted at baseline, as well as at the 2 and 4-week intervals.

RESULTS: Our study established the safety of a 4-week kneeling training program. Notably, the KNT group exhibited more pronounced improvements in BBS scores at weeks 2 and 4 compared to the CVR group. However, no significant disparities emerged in FMA-LE and gait analysis between the two groups. Our findings suggest that kneeling training may serve as a viable option for enhancing lower limb balance in survivors who have had a stroke.

CONCLUSIONS: We conclude that kneeling training, characterized by its safety, simplicity, and no restrictions on location or equipment, represents a valuable therapeutic approach for enhancing walking balance in individuals recovering from stroke.

TRIAL REGISTRATION: Clinical trials ChiCTR1900028385, December 20, 2019.

Language: en

Keywords: Rehabilitation; Balance; Kneeling training; Mobility; Stroke