

## Safety Literature 12<sup>th</sup> January 2020

### Does the balance strategy during walking in elderly persons show an association with fall risk assessment?

Ohtsu H, Yoshida S, Minamisawa T, Katagiri N, Yamaguchi T, Takahashi T, Yomogida SI, Kanzaki H. J. Biomech. 2020; ePub(ePub): ePub.

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#### Abstract

The primary objective of this study was to clarify whether balance evaluation during walking in elderly people was related to fall risk assessment; the second objective was to clarify the difference in balance strategy between young and elderly people based on the balance evaluation through a gait cycle. Thirty healthy young adults and 25 healthy elderly adults participated. All participants performed walking at their preferred speed and at a fast speed. Based on the margin of stability (MoS), balance during a gait cycle was divided into medial/lateral and anterior/posterior direction (ML/AP-MoS). Positive/negative integral values of ML-MoS were defined as ML-MoSPOS/ML-MoSNEG, and the average of AP-MoS over the gait cycle was defined as AP-MoSmean. The fast/preferred ratio of AP-MoSmean/ML-MoSPOS (AP-MoSmean (Fast/Preferred)/ML-MoSPOS (Fast/Preferred)) and the fast-preferred difference of ML-MoSNEG (ML-MoSNEG (Fast-Preferred)) were compared between groups. ML/AP-MoS at the preferred/fast gait was also compared between 12 gait events and groups. The Japanese version of the Mini-Balance Evaluation Systems Test (J-Mini-BESTest), the Japanese version of the Activities-specific Balance Confidence Scale (J-ABC scale), and the number of falls in the past year were obtained from all subjects. ML-MoSPOS (Fast/Preferred), ML-MoSNEG (Fast-Preferred), and AP-MoSmean (Fast/Preferred) were significantly correlated with J-Mini-BESTest. Gait balance evaluation based on MoS may reflect an individual's balance function. In fast gait, ML-MoS at foot flat and toe off and AP-MoS at just before heel strike were highly likely to be gait events to identify elderly adults with balance disorders.

Language: en

#### Keywords

Aging; Fall risk; Gait; Gait strategy; Margin of stability

## Functional ability, frailty and risk of falls in the elderly: relations with autonomy in daily living

Tornero-Quiñones I, Sáez-Padilla J, Espina Díaz A, Abad Robles MT, Sierra Robles Á. *Int. J. Environ. Res. Public Health* 2020; 17(3): e6.

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### Abstract

The objective of this research was to determine the differences in autonomy in both basic activities of daily life in instrumental activities of daily life, as well as functional capacity, fragility and risk of falls between an active group and a sedentary group. The individual associations of functional capacity, fragility and risk of falls were also analyzed, with autonomy in basic activities of daily living and in instrumental activities of daily living in the active group. In this cross-sectional investigation, 139 people from Huelva between 65 and 87 years of age were evaluated (Mean (M) = 73.1; standard deviation (SD) = 5.86); 100 were women and 39 men. The active and sedentary group were composed of 69 and 70 elderly people, respectively. The active group carried out a physical activity program. Among the results, a significant effect was seen in the multivariate contrast of the study variables,  $V = 0.24$ ,  $F(5, 137) = 8.58$ , and  $p < 0.001$ ; while in the linear regressions in the active group, the Vivifrail with the Barthel Index ( $\Delta$  Adj.  $R^2 = 0.15$ ) and with the Lawton and Brody Scale ( $\Delta$  Adj.  $R^2 = 0.22$ ) were used. In conclusion, the active group presented better values in all the variables evaluated in comparison to the sedentary group, establishing statistically significant differences. In addition, in the active group, it has been found that functional capacity is a significant predictive variable of autonomy in instrumental activities of daily living (22%), while fragility and the risk of falls are significant predictors of autonomy in activities of basic daily life (15%).

Language: en

### Keywords

exercise; falls; older people; prevention; quality of life

## Gait, cognition and falls over 5 years, and motoric cognitive risk in New Zealand octogenarians: Te Puāwaitanga o Nga Tapuwae Kia Ora Tonu, LiLACS NZ

Lord S, Moyes S, Teh R, Port W, Muru-Lanning M, Bacon CJ, Wilkinson T, Kerse N. BMC Geriatr. 2020; 20(1): e43.

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DOI 10.1186/s12877-020-1420-8 PMID 32024482

### Abstract

**BACKGROUND:** Understanding falls risk in advanced age is critical with people over 80 a rapidly growing demographic. Slow gait and cognitive complaint are established risk factors and together comprise the Motoric Cognitive Risk Syndrome (MCR). This study examined trajectories of gait and cognition and their association with falls over 5 years, and documented MCR in Māori and non-Māori of advanced age living in New Zealand.

**METHOD:** Falls frequency was ascertained retrospectively at annual assessments. 3 m gait speed was measured and cognition was assessed using the Modified Mini-Mental Status Examination (3MS). Frequency of MCR was reported. Gait and cognition trajectories were modelled and clusters identified from Latent Class Analysis. Generalised linear models examined association between changes in gait, cognition, MCR and falls.

**RESULTS:** At baseline, 138 of 408 Māori (34%) and 205 of 512 non-Māori (40%) had fallen. Mean (SD) gait speed (m/s) for Māori was 0.66 (0.29) and 0.82 (0.26) for non-Māori. Respective 3MS scores were 86.2 (15.6) and 91.6 (10.4). Ten (4.3%) Maori participants met MCR criteria, compared with 7 (1.9%) non-Māori participants. Māori men were more likely to fall (OR 1.56; 95% CI 1.0-2.43 (P = 0.04) whilst for non-Māori slow gait increased falls risk (OR 0.40; 95% CI 0.24-0.68(P < 0.001). Non-Māori with MCR were more than twice as likely to fall than those without MCR (OR 2.45; 95% CI 1.06-5.68 (P = 0.03).

**CONCLUSIONS:** Māori and non-Māori of advanced age show a mostly stable pattern of gait and cognition over time. Risk factors for falls differ for Māori, and do not include gait and cognition.

Language: en

## **Geriatric rehabilitation: gait in the elderly, fall prevention and Parkinson disease**

Swanson R, Robinson KM. *Med. Clin. North Am.* 2020; 104(2): 327-343.

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### **Abstract**

Aging-associated anatomic and physiologic decline begins during the fourth decade of life and progresses over the ensuing decades sometimes to a state of frailty, with the decline amplified when there is deconditioning. Aging-related gait and balance disorders leading to an increased risk of falling can be compensated for with the use of exercise interventions, durable medical equipment, and environmental modifications. Caregiver training is an essential component of geriatric rehabilitation.

Language: en

### **Keywords**

Aging; Caregivers; Deconditioning; Durable medical equipment; Geriatrics; Parkinsonism; Rehabilitation

## **Interprofessional education of emergency department team on falls in older adults**

DeDonato E, Hall SE, Hogan TM, Gleason LJ. *J. Am. Geriatr. Soc.* 2020; ePub(ePub): ePub.

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**DOI** 10.1111/jgs.16358 **PMID** 32031237

### **Abstract**

[Abstract unavailable]

Language: en

## **Obesity and falls in older women: mediating effects of muscle quality, foot loads and postural control**

Neri SGR, Harvey LA, Tiedemann A, Gadelha AB, Lima RM. *Gait Posture* 2020; 77: 138-143.

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**DOI** 10.1016/j.gaitpost.2020.01.025 **PMID** 32036318

### **Abstract**

**BACKGROUND:** Obesity is associated with an increased risk of falls in older women. However, it is not certain whether factors commonly associated with obesity and falls mediate this risk. **RESEARCH QUESTION:** Do lower-limb muscle quality, foot loads and postural control mediate the relationship between obesity and falls in women aged 60 years and older? **METHODS:** At baseline, 246 female participants underwent obesity screening ( $BMI \geq 30 \text{ kg/m}^2$ ), and measurements of muscle quality (isokinetic dynamometer and dual-energy X-ray absorptiometry), foot loads (pressure platform) and postural balance (force platform). Incident falls were recorded at the end of the 18-month follow-up period via participant recall. To test whether, and to what extent, biomechanical factors mediated the relationship between obesity and falls, the Natural Indirect Effects (NIE), Natural Direct Effect (NDE) and proportion mediated were calculated using the counterfactual approach. Significance level was set at  $p < .05$ .

**RESULTS:** 204 participants (83 %) completed the follow-up. As expected, obesity was associated with a higher risk of being a faller (RR: 2.13, 95 % CI: 1.39-3.27). Using the counterfactual approach, only specific torque (NIE: 1.11, 95 % CI: 1.01-1.38) and flatfoot (NIE: 1.10, 95 % CI: 1.01-1.32) were significant mediators of the relationship between obesity and falls. Specific torque and flatfoot mediated 19 % and 21 % of the relationship, respectively. **SIGNIFICANCE:** Lower-limb muscle quality (specific torque) and foot loads (flatfoot) mediate the relationship between obesity and falls in older women. The inclusion of muscle strengthening and podiatry interventions as part of a fall prevention program may benefit this population.

Language: en

### **Keywords**

Accidental falls; Body weight; Flatfoot; Muscle strength; Postural balance

## Section of the Balance Evaluation Systems Test (BESTest) cutoff values for walking speed level in older women with hip fracture

Miyata K, Hasegawa S, Iwamoto H, Shinohara T, Usuda S. J. Geriatr. Phys. Ther. 2020; ePub(ePub): ePub.

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### Abstract

**BACKGROUND AND PURPOSE:** Hip fracture is a common injury in older adults, with a high proportion of hip fractures affecting women. After a hip fracture, the recovery of the patient's walking speed is very important; one of the key determinants of walking speed is balance. The Balance Evaluation Systems Test (BESTest), a clinical balance measure, categorizes balance into 6 postural control systems. However, the relationship between the walking speed level and the sections of the BESTest has not been explored for older women with hip fracture. Our objective was to establish section scores for the BESTest cutoff values for walking speed in older women with hip fracture.

**METHODS:** This was an observational study involving 46 older women 65 years or older with hip fracture. The BESTest was administered to all participants upon their discharge from the hospital. Participants were divided into groups on the basis of their walking speed levels, and receiver operating characteristic curves were determined for each section of the BESTest. We calculated the cutoff value, area under the curve (AUC), sensitivity, and specificity of each.

**RESULTS:** Section IV-Stability in Gait showed the highest AUC (0.92) compared with the other sections, and the cutoff value determined for the fast and slow walker groups was 64.3% (sensitivity = 0.82, specificity = 0.83). The sections with moderate AUC (0.7-0.9) were I-Biomechanical Constraints (cutoff = 70.0%), III-Anticipatory Postural Adjustments (cutoff = 66.5%), IV-Postural Responses (cutoff = 69.4%), and V-Sensory Orientation (cutoff = 83.4%). The sections with the highest sensitivity (0.82) were I-Biomechanical Constraints and VI-Stability in Gait, and that with the highest specificity (0.88) was II-Stability Limits and Verticality.

**CONCLUSIONS:** Five of the BESTest sections (I-Biomechanical Constraints, III-Anticipatory Postural Adjustments, IV-Postural Responses, V-Sensory Orientation, and VI-Stability in Gait) were able to differentiate between fast and slow walkers among older women with hip fracture. Balance during gait and anticipatory postural adjustments were shown to be important components of balance, and their cutoff values were indicators of the balance required to reach fast walking levels.

Language: en

## The correlation between fall prevention knowledge and behavior in stroke outpatients

Huang Y, Wu C, Peng H, Chen Q, Fan X, Xiao L, Song B, Wan L. *J. Neurosci. Nurs.* 2020; ePub(ePub): ePub.

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### Abstract

**BACKGROUND:** Stroke outpatients have a high risk of falling. However, fall prevention measures in the community are insufficient to effectively reduce the fall rate among outpatients with stroke. We aimed to determine the correlation between fall prevention knowledge and behavior among outpatients with stroke and provide new strategies for community fall prevention.

**METHODS:** We recruited 124 patients with stroke who were followed up in the outpatient department of a tertiary hospital in Zhuhai, China. Patients were assessed using a general information questionnaire, a fall prevention knowledge questionnaire for patients with stroke, and the Stroke Fall Prevention Behavior Scale. IBM SPSS 22.0 software was used for statistical analysis.

**RESULTS:** The median fall prevention knowledge was 82.76 (68.97, 93.10) points, out of 100. The mean (SD) score for fall prevention behavior was 2.90 (0.52; range, 1-4) points. Fall prevention knowledge scores were positively related to those fall prevention behavior (Spearman  $r = 0.454$ ,  $P < .01$ ).

**CONCLUSION:** Levels of fall prevention knowledge among outpatients with stroke were adequate, and this population had medium to high levels of fall prevention behavior. Better knowledge was accompanied with better prevention of falls. However, whether enriching the knowledge could lead to improvement of fall prevention is still undetermined.

Language: en



## The effect of mental health on the recurrent falls among elderly using Community Health Survey data in Korea

Jo KH, Park J, Ryu SY. Epidemiol. Health 2020; ePub(ePub): ePub.

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### Abstract

**OBJECTIVES:** The aim of this study was to identify the effect of mental health according to the experienced frequency of falls(single falls, recurrent falls) of the elderly.

**METHODS:** We conducted a chi-square test to compared differences in health related behaviors, chronic diseases, and mental health according to the experienced frequency in elderly using the Korean Community Health Survey(KCHS)2015. Multinomial logistic regression analysis was used to identify the effects of mental health between the single falls and recurrent falls in the elderly using significant variables in the chi-square test.

**RESULTS:** The results of the study showed that the recurrent falls experience was more risky than the single falls experience. In the falls experience, depression experience(OR = 1.27, 95% CI, 1.10-1.45) was significantly affected to single falls. Moreover, depression experience(OR = 1.43, 95% CI, 1.25-1.63), sleep duration(OR=1.22, 95% CI, 1.03-1.44) and subjective stress (OR = 1.94, 95% CI, 1.56-2.41) was significantly affected to recurrent falls.

**CONCLUSION:** Our findings suggest that distinguished prevention program of falls is needed according to the falls experience frequency of the elderly. In particular, in the case of recurrent fallers, systematic treatment strategies and rehabilitation training to improve physical function and mental health are needed.

Language: en

### Keywords

Accidental Falls; Aged; Community Health Survey; Depression; Mental health; Stress

## **The impact of obstructive sleep apnoea on balance, gait and falls risk: a narrative review of the literature**

Stevens D, Jackson B, Carberry J, McLoughlin J, Barr C, Mukherjee S, Oh A, McEvoy RD, Crotty M, Vakulin A. J. Gerontol. A Biol. Sci. Med. Sci. 2020; ePub(ePub): ePub.

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### **Abstract**

Falls related hospitalisation and injury rates are steadily increasing globally due to a growth in the aging population, and the associated health problems that increase risk of falls. One such associated health problem is sleep disturbances and disorders. Recent cohort studies have shown that subjectively reported poor quality sleep is associated with an increased risk of falls. Obstructive sleep apnoea (OSA) is a common sleep disorder characterised by the repetitive reductions, or cessation, of airflow. Some studies have shown that OSA impairs posture/balance and gait with nocturnal hypoxemia the likely main cause. Emerging evidence suggests that treating OSA by continuous positive airway pressure (CPAP) can improve gait, but no studies to date have examined the effect of CPAP on posture/balance. The overall control of balance relies on a complex interaction between several physiological functions including vestibular, muscle, visual and cognitive functions. We postulate that OSA impacts balance by affecting these different systems to various degrees, with the nocturnal hypoxic burden likely playing an important role. Importantly, these impairments in balance/posture and possible falls risk may be alleviated by OSA treatment. Larger mechanistic studies are needed to properly elucidate how OSA affects falls risk and future large-scale randomised control trials are needed to determine the effectiveness of OSA treatment in reducing the risk of falls.

Language: en

### **Keywords**

hypoxemia; posturography; sleep disordered breathing; sleep disorders; vestibular organ

## **The tensions between micro-, meso- and macro-levels: physiotherapists' views of their role towards fall prevention in the community - a qualitative study**

Cerderbom S, Bjerk M, Bergland A. BMC Health Serv. Res. 2020; 20(1): e97.

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**DOI** 10.1186/s12913-020-4940-1 **PMID** 32028938

### **Abstract**

**BACKGROUND:** Falls are a global public health concern. Physiotherapists are a key resource in this context, but there is sparse knowledge about how they perceive their role in the primary care setting. Therefore, the purpose of the present study is to explore physical therapists' (PTs) view of how they experience and perceive their role working with fall prevention in a community care setting.

**METHODS:** Semi-structured interviews were conducted with 17 physiotherapists. Data were analysed using a qualitative thematic analysis.

**RESULTS:** The analysis resulted in a core theme and three subthemes. The core theme was 'capability to cope with the tensions between the micro-, meso- and macro-levels in fall, prevention', which indicated the importance of an evolving multifaceted, evidence based and innovative physiotherapy role. A key factor for this role is to take an integrative biopsychosocial approach based on how biological and psychosocial factors are uniquely related in fall prevention. The three themes were as follows: 1) always moving and changing: the competent explorative knowledge-hungry clinician's multifaceted role; 2) multiprofessional - but in the end alone; 3) reaching out - from the bottom to the top. Success in the role of physiotherapists in fall prevention depends on the empowering leadership and working culture, as well as on the time and multifaceted professional competence of the clinicians.

**CONCLUSION:** Our findings indicate that the PTs' role reflects their abilities to change and improve their professional work in accordance with evidence based knowledge. To ensure good quality the PTs focused on the special needs of the patients, evidence-based fall prevention, interdisciplinary team work, good clinical competences, good skills in communication, and interpersonal relations. Attention should be placed on the importance of biopsychosocial perspective framing in the actual clinical and political context. The PTs saw the need for working at the micro-, meso- and macro-levels to succeed in the work of fall prevention.

Language: en

### **Keywords**

Communication; Empowerment; Fall prevention; Implementation; Older people

## Effects of sleep duration and weekend catch-up sleep on falling injury in adolescents: a population-based study

Chung JH, Kim JB, Kim JH. Sleep Med. 2019; 68: 138-145.

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DOI 10.1016/j.sleep.2019.12.005 PMID 32036286

### Abstract

**OBJECTIVE:** This population-based study aimed to determine the effects of sleep deprivation and compensatory weekend catch-up sleep on the risk of falls in adolescents.

**METHODS:** Data from the 2013 Korean Youth Risk Behavior Web-based Survey on 57,225 adolescents were investigated. Demographic, socioeconomic, sleep-related, health-related behavioral, and psychological variables were compared between fallers ( $n = 7346$ ) and non-fallers ( $n = 49,879$ ). Multivariate logistic regression analysis using a hierarchical model was carried out to identify sleep-related factors (eg, sleep duration, longer weekend catch-up sleep) independently contributing to the risk of falls.

**RESULTS:** Compared to non-fallers, fallers were associated with a shorter sleep duration ( $p = 0.001$ ) and later bedtimes on weekdays and weekends ( $p < 0.001$ ). An average sleep duration of  $\leq 5$  h (odds ratio [OR] 1.23, 95% confidence interval [CI] 1.12-1.34) and of 6 h (OR 1.12, CI 1.03-1.21) were associated with an increased risk of falls. By contrast, an average sleep duration of  $\geq 9$  h (OR 0.90, CI: 0.82-0.99) and longer weekend catch-up sleep (OR 0.94, CI: 0.89-0.99) were associated with a decreased risk of falls.

**CONCLUSION:** Our results corroborate previous suggestions that short sleep duration is a major risk factor for falls among adolescents. Moreover, our study provided a novel finding that longer sleep duration and longer weekend catch-up sleep may have a protective effect against falls. Our findings have important public health implications that modifying school schedules to increase sleep duration could reduce unintentional falls and injuries in school-aged adolescents.

Language: en

### Keywords

Adolescents; Falls; Sleep duration; Weekend catch-up sleep

## **Exploring enablers and barriers to accessing health services after a fall among people with intellectual disability**

Ho P, Bulsara C, Patman S, Downs J, Hill AM. *J. Appl. Res. Intellect. Disabil.* 2020; ePub(ePub): ePub.

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### **Abstract**

**BACKGROUND:** Adults with intellectual disability experience high rates of falls making falls prevention an important health need. The purpose of the study was to seek perspectives of older adults with intellectual disability and their caregivers to (a) explore the experiences of older adults with intellectual disability when seeking healthcare services after a fall and (b) identify enablers and barriers when taking up evidence-based falls recommendations.

**METHOD:** A qualitative exploratory study was undertaken as part of a prospective observational cohort study. Semi-structured interviews were conducted with a purposeful sample. Data were analysed thematically using Colaizzi's method.

**RESULTS:** Seventeen interviews were conducted ( $n = 21$ ). Emergent themes demonstrated that participants had limited knowledge about falls prevention. Enablers included individualizing falls prevention strategies. Barriers included not being offered access to established falls prevention pathways.

**CONCLUSION:** There is an urgent need to develop high-quality falls prevention services for older adults with intellectual disability.

Language: en

### **Keywords**

accidental falls; barriers and enablers; intellectual disability; referral and consultation

**Diffuse superficial siderosis: a rare cause of recurrent falls in elderly**

Ee DYH, Tang D, Au LSY, Sze YL. Intern. Med. J. 2020; 50(2): 257-258.

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**Abstract**

[Abstract unavailable]

Language: en

## **Kyphosis and 3-year fall risk in community-dwelling older men**

McDaniels-Davidson C, Nichols JF, Vaida F, Marshall LM, Kado DM. *Osteoporos. Int.* 2020; ePub(ePub): ePub.

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**DOI** 10.1007/s00198-019-05155-8 **PMID** 32040599

### **Abstract**

Hyperkyphosis is thought to be a fall risk factor in older adults. This large study of older men found that fall risk increased with greater kyphosis measured with the blocks method, but did not find an association between kyphosis and falls when measured by the commonly used the Cobb angle method.

**INTRODUCTION:** Research suggests an association between hyperkyphosis and falls in community-dwelling older adults, though this has not been investigated within large, population-based studies. This study sought to determine whether two measures of kyphosis prospectively predict fall risk over 3 years among older men.

**METHODS:** Within the Osteoporotic Fractures in Men Study (MrOS), we conducted two 3-year prospective studies of 2346 and 2928 men. The first group had kyphosis measured by the Cobb angle at visit 1, while the second group had kyphosis assessed with the blocks method at visit 3; both groups then self-reported falls tri-annually for 3 years. Poisson regression with GEE was used to obtain relative risks (RR) of falls.

**RESULTS:** The fall rates over 3 years were 651/1000 person-years among the visit 1 sample (mean age  $74 \pm 6$  years) and 839/1000 person-years among the visit 3 sample (mean age  $79 \pm 5$  years). In adjusted models of the visit 3 sample, the risk of falls was increased by 12% for each standard deviation increase (1.4 blocks) in the number of blocks required to achieve a neutral head and neck position (RR = 1.12, 95% CI = 1.06, 1.18). The Cobb angle was not associated with falls in the visit 1 sample.

**CONCLUSIONS:** Although the Cobb angle did not predict falls in community-dwelling older men over 3 years, the blocks method of measuring kyphosis was predictive of falls in this population. This difference could be due to the Cobb angle's focus on thoracic kyphosis, whereas the blocks method may additionally capture abnormal cervical spine curvature.

Language: en

### **Keywords**

Cobb angle; Falls; Hyperkyphosis; Kyphosis; Older adults

## **Limits of stability and functional base of support while standing in community-dwelling older adults**

Tomita H, Kuno S, Kawaguchi D, Nojima O. *J. Mot. Behav.* 2020; ePub(ePub): ePub.

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### **Abstract**

This study aimed to determine, among community-dwelling older adults, effects of aging on limits of stability in various directions and total area of functional base of support (FBoS) while standing. Forty-three older adults and 43 young adults maintained limits of stability in eight directions. FBoS was defined as the octagon formed by the corners made by the positions of center of pressure in the eight stability limits. FBoS area was smaller in older adults ( $36.6\% \pm 7.6\%$  of base of support) than in young adults ( $47.2\% \pm 6.4\%$ ). Although the reduction in limits of stability in older adults can occur in all directions, the degree of the reduction varies in a direction-specific manner.

Language: en

### **Keywords**

Balance; aging; center of pressure; stance control



## **Out of balance - Postural control in cancer patients before and after neurotoxic chemotherapy**

Müller J, Ringhof S, Vollmer M, Jäger LB, Stein T, Weiler M, Wiskemann J. *Gait Posture* 2020; 77: 156-163.

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### **Abstract**

**BACKGROUND:** Chemotherapy-induced peripheral neuropathy (CIPN) is a serious side effect deriving from neurotoxic chemotherapeutic agents. The underlying nerve injury can affect proprioception causing impaired postural control, gait difficulties and a higher risk of falling. Overall, the symptoms and functional limitations negatively affect patients' independence and quality of life. **RESEARCH QUESTION:** Our objective was to analyze postural control in cancer patients before and after neurotoxic chemotherapy and to compare these data to healthy controls.

**METHODS:** Participants were 35 cancer patients (PAT) and 35 healthy, one-to-one gender, age, height, and weight matched controls (HMC). Postural control of HMC was tested once, whereas PAT were tested prior to (PATpre) and three weeks after completion of neurotoxic chemotherapy (PATpost). Temporal, spatial and frequency domain measures of the center of pressure (COP) were calculated using a force plate. The following balance conditions were analyzed: bipedal stance with open (BPEO) and closed eyes (BPEC), semi-tandem (STEO, STEC) and monopodal stance (MPEO). CIPN was assessed clinically (Total Neuropathy Score) and via questionnaire. Time and group differences were determined by using Wilcoxon-signed-rank tests. Spearman correlation was applied to analyze associations between severity of CIPN and postural control.

**RESULTS:** PATpost showed significantly increased temporal and spatial measures of the COP ( $p < .05$ ) - both after neurotoxic chemotherapy (PATpre-PATpost) and in comparison to HMC. Withdrawal of visual control resulted in greater temporal and spatial COP displacements in PATpost than in the comparative groups (PATpre, HMC). Correlation analyzes revealed moderate associations of COP measures with clinical CIPN measures and low to none for the questionnaires. **SIGNIFICANCE:** Three weeks after completion of neurotoxic chemotherapy, PATpost showed significant balance deficits compared to PATpre and HMC. Especially the deficits in the standing conditions with closed eyes may indicate an impaired proprioception. This hypothesis is supported by the finding that stronger CIPN symptoms were associated with poorer postural control. However, future studies need to take further influencing factors on postural control into account (e.g. strength) in order to generate efficacious rehabilitation measures.

Language: en

### **Keywords**

Balance; Cancer; Chemotherapy; Peripheral neuropathy; Postural stability; Proprioception