

## SafetyLit April 23, 2017

### A study to evaluate host factors for musculoskeletal injuries secondary to trauma among elderly people of Northwestern India

Raina SK, Thakur L, Awasthi B, Pathak S.

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#### Abstract

**Introduction:** As the population ages, the problems related to falls and fractures are expected to grow. This poses a great challenge to the health-care systems. Meeting these challenges requires a clear understanding of the prevalence and nature of falls. It also means identifying factors responsible for injury causation. The current study was conducted with the aim to evaluate host factors responsible for musculoskeletal injuries (MSIs) in the elderly.

**Materials and Methods:** A hospital-based, questionnaire-based, descriptive study was conducted on all elderly (60 years) patients attending a tertiary care teaching hospital with MSIs secondary to trauma between 2013 and 2014.

**Results:** A total of 200 elderly with MSIs secondary to trauma attending the tertiary care center between 2013 and 2014 were evaluated for the purpose of this study. Exactly half of them (50%) were more than 70 years of age. Intoxication and presence of visual and hearing impairment were observed as significantly associated with occurrence of MSIs.

**Discussion:** Trauma is a common cause of MSI among the elderly. Therefore, identification and evaluation of host factors are important as this can help in planning prevention of injuries in elderly.

**Conclusion:** MSIs due to trauma are a focus of public health practice as they pose a serious health threat, occur frequently, and are in most situations preventable.

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### F2D: a location aware fall detection system tested with real data from daily life of elderly people

Kostopoulos P, Kyritsis AI, Deriaz M, Konstantas D.

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#### Abstract

Falls among older people remain a very important public healthcare issue. In the majority of fall events external support is imperative in order to avoid major consequences. Therefore, the ability to automatically detect these fall events could help reducing the response time and significantly improve the prognosis of fall victims. This paper presents a practical real time fall detection system running on a smartwatch (F2D). A decision module takes into account the rebound after the fall and the residual movement of the user, matching a detected fall pattern to an actual fall. The last module of F2D is the location module which makes our system very useful for nursing homes that host elderly people. The fall detection algorithm has been tested by Fondation Suisse pour les Téléthèses (FST), the project partner who is responsible for the commercialization of our system. By testing with real data and achieving an accuracy of 96.01% we have a fall detection system ready to

be deployed on the market and by adding the location module we can provide it to nursing homes for elderly people.

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#### Factors associated with hospital admission after an emergency department treat and release visit for older adults with injuries

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**INTRODUCTION:** Emergency Department (ED) visits for injury often precede hospital admissions in older adults, but risk factors for these admissions are poorly characterized. We sought to determine the incidence and risk factors for hospitalization shortly following discharge home from an ED visit for traumatic injury in older adults. We hypothesized higher risk for admission in those with increased age, discharged home after falls, with increased comorbidity burden, and who live in poor neighborhoods.

**METHODS:** We identified all community-dwelling patients  $\geq 65$  years old treated and released for traumatic injury at non-federal EDs in Florida using the 2011 State Inpatient Database and State ED Database of the Agency for Healthcare Research and Quality. Outcome measures were hospitalization within 9 and 30 days of discharge from the ED. Multivariable logistic regression was used to establish independent risk factors for hospital admission.

**RESULTS:** Of 163,851 index ED injury visits, 6298 (3.8%) resulted in inpatient admissions within 9 days and 12,938 (7.9%) within 30 days. Factors associated with increased odds of admission within 9 days included: each additional comorbidity,  $\geq$  moderate injury to abdomen or pelvis/extremities, and median neighborhood income  $<$  \$39,000. Additional factors associated with increased odds of admission within 30 days included: lack of private insurance supplement and median neighborhood income  $<$  \$48,000.

**CONCLUSION:** Among older adults treated and discharged from the ED for an injury, those who have high comorbidity burdens, have abdominal or orthopedic injuries, and live in poor neighborhoods are at increased risk of hospitalization within 9 or 30 days of ED discharge.

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#### Falls among the non-institutionalized elderly in northern Minas Gerais, Brazil: prevalence and associated factors

Carneiro JA, Ramos GCF, Barbosa ATF, Vieira DS, Silva JSR, Caldeira AP.

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#### Abstract

**OBJECTIVE:** To identify the prevalence of falls and associated factors in non-institutionalized elderly persons.

**METHODS:** A cross-sectional study featuring a population-based sample of non-institutionalized elderly persons in a city in the north of Minas Gerais was performed. Interviews were conducted in households by trained staff using validated instruments. We investigated the associations between falls and demographic, socioeconomic and health-related factors. After bivariate analysis, the variables associated with falls to a level of 20% were analyzed together using logistic regression, assuming at this stage a significance level of 5%.

**RESULTS:** The studied population was predominantly female, married and with a low educational level. The prevalence of falls was 28.4%. The factors that were associated with falls were: female gender (OR=1.67; 95% CI:1.13 to 2.47); negative self-evaluation of health (OR=1.49; 95% CI: 1.02 to 2.20); impaired functional mobility (Timed Up and Go test >20 seconds) (OR=1.66; 95%CI: 1.02-2.74); the occurrence of hospitalization in the previous 12 months (OR=1.82; 95% CI: 1.17 to 2.84); and frailty measured by the Edmonton Frail Scale (OR=1.73; 95% CI: 1.14 to 2.64).

**CONCLUSIONS:** The prevalence of falls was high for the population studied and was related to the individual health conditions of the elderly.

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### **Hazard ratio and repeat injury for dementia in patients with and without a history of traumatic brain injury: a population-based secondary data analysis in Taiwan**

Chu SF, Chiu WT, Lin HW, Chiang YH, Liou TH.

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#### **Abstract**

The impact of traumatic brain injury (TBI) on the pathogenic hazard ratio (HR) for dementia patients is still controversial. Some studies have supported the association between TBI and dementia, especially for Alzheimer's disease, and our study determined that the HR of dementia patients with and without a history of TBI or repeated TBI (RTBI). We determined the HR for dementia patients with a diagnosis of TBI (n = 12931) and a comparative cohort with age- and gender-matched controls (n = 51724) during 2004-2005, using Taiwan's National Health Insurance Research Database. The adjusted HR (HR = 3.21) for dementia patients with TBI showed that they were more likely to develop dementia than the comparison cohort. The HR for dementia patients with RTBI was increased to 3.62. The results of this large-scale study suggested that TBI increases dementia risk. Future studies using animal models and epidemiological databases could elucidate medical and biological mechanisms linking TBI and the development of dementia.

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### **Racial and ethnic difference in falls among older adults: results from the California Health Interview Survey**

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*J. Racial Ethn. Health Disparities* 2017; ePub(ePub): ePub.

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### Abstract

**BACKGROUND:** Research suggests that fall risk among older adults varies by racial/ethnic groups; however, few studies have examined fall risk among Hispanics and Asian American older adults.

**METHODS:** Using 2011-2012 California Health Interview Survey data, this study examines falling  $\geq 2$  times in the past year by racial/ethnic groups (Asian Americans, Hispanics, and Blacks) aged  $\geq 65$ , adjusting for socio-demographic characteristics, body mass index, co-morbidities, and functional limitations. A secondary analysis examines differences in fall risk by English language proficiency and race/ethnicity among Asian Americans and Hispanics.

**RESULTS:** Asian Americans were significantly less likely to fall compared to non-Hispanic whites, individuals with  $\geq 2$  chronic diseases were significantly more likely to fall than individuals with  $< 2$  chronic diseases, and many functional limitations were significantly associated with fall risk, when adjusting for all factors. African Americans and Hispanics did not differ significantly from non-Hispanic whites. Analysis adjusting for race/ethnicity and English language proficiency found that limited English proficient Asian Americans were significantly less likely to fall compared to non-Hispanic whites, individuals with  $\geq 2$  chronic diseases were significantly more likely to fall than individuals with  $< 2$  chronic diseases, and all functional limitations were significantly associated with fall risk, when adjusting for all factors. No differences were found when examining by racial/ethnic and English proficient/limited English proficient groups.

**CONCLUSION:** Further research is needed to explore factors associated with fall risks across racial/ethnic groups. Culturally relevant and targeted interventions are needed to prevent falls and subsequent injuries in the increasingly diverse aging population in the USA.

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### Risk of falls associated with antiepileptic drug use in ambulatory elderly populations: A systematic review

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### Abstract

**BACKGROUND:** Falls are a major cause of morbidity and mortality in older adults. About a third of those aged 65 years or older fall at least once each year, which can result in hospitalizations, hip fractures and nursing home admissions that incur high costs to individuals, families and society. The objective of this clinical review was to assess the risk of falls in ambulatory older adults who take antiepileptic drugs, medications that can increase fall risk and decrease bone density.

**METHODS:** PubMed, EMBASE, MEDLINE and the Cochrane Library electronic databases were searched from inception to July 2014. Case-control, quasi-experimental and observational design studies published in English that assessed quantifiable fall risk associated with antiepileptic drug use in ambulatory patient populations with a mean or median age of 65 years or older were eligible for inclusion. One author screened all titles and abstracts from the initial search. Two authors independently reviewed and abstracted data from full-text articles that met eligibility criteria.

**RESULTS:** Searches yielded 399 unique articles, of which 7 met inclusion criteria-4 prospective or longitudinal cohort studies, 1 cohort study with a nested case-control, 1 cross-sectional survey and 1

retrospective cross-sectional database analysis. Studies that calculated the relative risk of falls associated with antiepileptic drug use reported a range of 1.29 to 1.62. Studies that reported odds ratios of falls associated with antiepileptic drug use ranged from 1.75 to 6.2 for 1 fall or at least 1 fall and from 2.56 to 7.1 for more frequent falls.

DISCUSSION: Health care professionals should monitor older adults while they take antiepileptic drugs to balance the need for such pharmacotherapy against an increased risk of falling and injuries from falls.

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### **Spinal and corticospinal pathways are differently modulated when standing at the bottom and the top of a three-step staircase in young and older adults**

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*Eur. J. Appl. Physiol.* 2017; ePub(ePub): ePub.

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#### **Abstract**

**PURPOSE:** This study investigated the modulation of spinal (group Ia afferents) and corticospinal pathways when young ( $22.7 \pm 1.3$  years) and older adults ( $72.2 \pm 7.9$  years) stood at the bottom and at the top of a three-step staircase equipped with force platforms.

**METHOD:** Changes in submaximal H-reflex amplitude (H 50) and slope of the H-reflex input-output relation (spinal pathway), and in amplitude of motor-evoked potentials (MEP) triggered by transcranial magnetic stimulation (corticospinal pathway) at two intensities (1.1× and 1.2× motor threshold) were recorded in soleus when subjects stood as steady as possible downstairs and upstairs. The centre of pressure (CoP) excursion was analyzed in the time and frequency domains in both conditions.

**RESULTS:** Regardless of age, the mean CoP velocity was greater when standing upstairs ( $11.1 \pm 3.5$  mm s<sup>-1</sup>) than downstairs ( $9.0 \pm 2.3$  mm s<sup>-1</sup>);  $p = 0.002$ ). The CoP power spectral density (PSD) in the 0-0.5 Hz band was greater upstairs than downstairs (+18.4%;  $p = 0.03$ ) whereas PSD in the 2-20Hz frequency band was lesser (-41%) upstairs than downstairs ( $p < 0.001$ ), regardless of age. In both groups, the H 50 amplitude (-30.6%;  $p < 0.001$ ) and slope of H-reflex input-output relation (-10.2%;  $p = 0.002$ ) were lesser when standing upstairs than downstairs, whereas no significant difference was observed in MEP amplitude and silent period between balance conditions ( $p > 0.05$ ).

**CONCLUSION:** These results indicate a lower dependence on spinal pathway to control soleus motor neurones when standing upstairs than downstairs accompanied by a change in postural control. This suggests that healthy older adults preserved their ability to adjust postural control to environmental demands.

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### **Symptoms of apathy independently predict incident frailty and disability in community-dwelling older adults**

Ayers E, Shapiro M, Holtzer R, Barzilai N, Milman S, Verghese J.

*J. Clin. Psychiatry* 2017; ePub(ePub): ePub.

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### **Abstract**

**OBJECTIVE:** Although depressive symptoms are widely recognized as a predictor of functional decline among older adults, little is known about the predictive utility of apathy in this population. We prospectively examined apathy symptoms as predictors of incident slow gait, frailty, and disability among non-demented, community-dwelling older adults.

**METHODS:** We examined 2 independent prospective cohort studies—the LonGenity study (N = 625, 53% women, mean age = 75.2 years) and the Central Control of Mobility in Aging (CCMA) study (N = 312, 57% women, mean age = 76.4 years). Individuals were recruited from 2008 to 2014. Apathy was assessed using 3 items from the Geriatric Depression Scale. Slow gait was defined as 1 standard deviation or more below age- and sex-adjusted mean values, frailty was defined using the Cardiovascular Health Study criteria, and disability was assessed with a well-validated disability scale.

**RESULTS:** The prevalence of apathy was 20% in the LonGenity cohort and 26% in the CCMA cohort. The presence of apathy at baseline, independent of depressive symptoms (besides apathy), increased the risk of developing incident slow gait (hazard ratio [HR] = 2.10; 95% CI, 1.36-3.24; P = .001), frailty (HR = 2.86; 95% CI, 1.96-4.16; P <.001), and disability (HR = 3.43; 95% CI, 1.73-6.79; P <.001) in the pooled sample. These associations remained significant when accounting for demographics, medical illnesses, and cognitive function.

**CONCLUSIONS:** Apathy is associated with increased risk of developing slow gait, frailty, and disability, independent of other established risk factors, in non-demented older adults. Apathy should be screened for as a potentially preventable cause of functional decline in clinical psychiatric settings.

### **PDF Endnote Y**

#### **Task-optimal auditory attention set restored as fast in older as in younger adults after distraction**

Volosin M, Gaál ZA, Horváth J.

*Biol. Psychol.* 2017; ePub(ePub): ePub.

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### **Abstract**

The present study investigated how fast younger and older adults recovered from a distracted attentional state induced by rare, unpredictable sound events. The attentional state was characterized by the auditory N1 event-related potential (ERP), which is enhanced for sound events in the focus of attention. Younger (19-26 years) and older (62-74 years) adults listened to continuous tones containing rare pitch changes (glides) and short gaps. Glides and gaps could be separated in 150ms, 250ms, 650ms or longer and the task was gaps detection while ignoring glides. With longer glide-gap separations similar N1 enhancements were observable in both groups suggesting that the duration of the distracted sensory state was not affected by aging. Older adults responded,



however, slower at short glide-gap separations which indicated that distraction at subsequent levels of processing may have nonetheless more impact in older than in younger adults.

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### **The effects of pilates on the elderly: an integrative review**

da Costa LMR, Schulz A, Haas AN, Loss J.

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#### **Abstract**

**INTRODUCTION:** Pilates is considered a form of exercise that aims to improve flexibility, resistance, strength, balance and coordination. As a result, many elderly people have tried the method seeking to improve or maintain their health.

**OBJECTIVE:** The present study aimed to review the effects of Pilates on the elderly.

**METHODS:** An integrative review was carried out that studied elderly persons undergoing an intervention based on the Pilates method, combined or not with other techniques. The guiding question considered existing studies in literature that evaluated the effects of Pilates on the elderly. Searches of the MEDLINE (PubMed), Scopus and Physiotherapy Evidence Database (PEDro) electronic databases were conducted in May 2014.

**RESULTS:** Of a total of 445 studies found, 17 articles were included. Several variables were analyzed, with balance and the risk of falling described most frequently.

**CONCLUSIONS:** The most studied variables were balance and the risk of falling and there was consensus among the studies regarding the improvement that Pilates caused in these variables. There was also agreement about increased flexibility, but controversy continues to surround the other effects reported in literature, or the data is isolated and therefore inconclusive. Among the studies found, most were experimental, and there were only two randomized controlled trials. The performance of more clinical trials featuring high quality methodological approaches addressing the theme is recommended, so that systematic reviews with meta-analysis may be performed, ensuring greater reliability of the results suggested in this study.

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### **To recognize fall related psychological concern should not lead to neglect other psychomotor consequences of falls**

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*Geriatr. Gerontol. Int.* 2017; 17(4): 666-667.

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#### **Abstract**

[Abstract unavailable] Letter to editor

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### **Why do patients with Parkinson's disease fall? A cross-sectional analysis of possible causes of falls**

Schrag A, Choudhury M, Kaski D, Gallagher DA.

*NPJ Parkinsons Dis.* 2015; 1: e15011.

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(Copyright © 2015, Parkinson's Disease Foundation USA, Publisher Nature Publishing Group)

**DOI** 10.1038/npjparkd.2015.11 **PMID** 28409181 **PMCID** PMC5388183

#### **Abstract**

**BACKGROUND:** Falls in Parkinson's disease (PD) are associated with significant injury, disability, hospitalization, and reduced quality of life. **AIMS:** To identify modifiable medical causes of falls in a cohort of PD patients.

**METHODS:** Eighty seven PD patients were interviewed and examined using validated scales assessing motor and nonmotor aspects of PD, comorbidities and medication use. The frequency of falls in the last month was the primary outcome measure. Falls were hypothesized to be associated with increasing age, advanced motor severity, particularly axial features (e.g., freezing and postural instability), and dyskinesia. Nonmotor features hypothesized to be associated with falls included; cognitive impairment, psychosis, sleep disorders, cardiovascular dysfunction, and ophthalmological and medical comorbidities.

**RESULTS:** Fallers had longer disease duration, higher Levodopa-equivalent doses, greater 'On' time with dyskinesia (all  $P < 0.005$ ), and higher scores on some Movement Disorder Society-Unified Parkinson's Disease Rating Scale items, particularly axial scores. However, patients with falls did not differ from non-fallers in age or overall motor UPDRS scores. Severity of psychosis, executive cognitive impairment, autonomic (particularly cardiovascular) dysfunction and sleep disturbances (particularly REM sleep behavioral disorder) were significantly associated with falls (all  $P < 0.005$ ). Fallers more frequently reported use of antidepressants (both tricyclics and SSRIs) and neuroleptics ( $P < 0.001$ ), but not hypnotics. There was no difference in medical comorbidities, ophthalmological assessments, fatigue, and apathy scores between the groups. In logistic regression analysis, cardiovascular dysfunction, antidepressant use, and REM sleep behavioral disorder were significantly associated with falls.

**CONCLUSIONS:** The causes of falls in PD are multifactorial and extend beyond motor impairment and dyskinesia; addressing these in patients already treated with dopaminergic medications has the potential to improve this important complication of PD.

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### **Comparison of the Classifier Oriented Gait Score and the Gait Profile Score based on imitated gait impairments**

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*Gait Posture* 2017; 55: 49-54.

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## Abstract

Common summary measures of gait quality such as the Gait Profile Score (GPS) are based on the principle of measuring a distance from the mean pattern of a healthy reference group in a gait pattern vector space. The recently introduced Classifier Oriented Gait Score (COGS) is a pathology specific score that measures this distance in a unique direction, which is indicated by a linear classifier. This approach has potentially improved the discriminatory power to detect subtle changes in gait patterns but does not incorporate a profile of interpretable sub-scores like the GPS. The main aims of this study were to extend the COGS by decomposing it into interpretable sub-scores as realized in the GPS and to compare the discriminative power of the GPS and COGS. Two types of gait impairments were imitated to enable a high level of control of the gait patterns. Imitated impairments were realized by restricting knee extension and inducing leg length discrepancy. The results showed increased discriminatory power of the COGS for differentiating diverse levels of impairment. Comparison of the GPS and COGS sub-scores and their ability to indicate changes in specific variables supports the validity of both scores. The COGS is an overall measure of gait quality with increased power to detect subtle changes in gait patterns and might be well suited for tracing the effect of a therapeutic treatment over time. The newly introduced sub-scores improved the interpretability of the COGS, which is helpful for practical applications.

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### **The sense of balance in humans: structural features of otoconia and their response to linear acceleration**

Kniep R, Zahn D, Wulfes J, Walther LE.

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## Abstract

We explored the functional role of individual otoconia within the otolith system of mammals responsible for the detection of linear accelerations and head tilts in relation to the gravity vector. Details of the inner structure and the shape of intact human and artificial otoconia were studied using environmental scanning electron microscopy (ESEM), including decalcification by ethylenediaminetetraacetic acid (EDTA) to discriminate local calcium carbonate density. Considerable differences between the rhombohedral faces of human and artificial otoconia already indicate that the inner architecture of otoconia is not consistent with the point group  $\bar{3}m$ . This is clearly confirmed by decalcified otoconia specimen which are characterized by a non-centrosymmetric volume distribution of the compact 3+3 branches. This structural evidence for asymmetric mass distribution was further supported by light microscopy in combination with a high speed camera showing the movement of single otoconia specimen (artificial specimen) under gravitational influence within a viscous medium (artificial endolymph). Moreover, the response of otoconia to linear acceleration forces was investigated by particle dynamics simulations. Both, time-resolved microscopy and computer simulations of otoconia acceleration show that the dislocation of otoconia include significant rotational movement stemming from density asymmetry. Based on

these findings, we suggest an otolith membrane expansion/stiffening mechanism for enhanced response to linear acceleration transmitted to the vestibular hair cells.

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