

Safety Literature 26th January 2020

A study protocol for a randomized controlled trial evaluating vibration therapy as an intervention for postural training and fall prevention after distal radius fracture in elderly patients

Wong RMY, Ho WT, Tang N, Tso CY, Ng WKR, Chow SK, Cheung WH. *Trials* 2020; 21(1): e95.

Department of Orthopaedics and Traumatology, Prince of Wales Hospital, The Chinese University of Hong Kong, Sha Tin, Hong Kong SAR, China. louis@ort.cuhk.edu.hk.

(Copyright © 2020, Holtzbrinck Springer Nature Publishing Group - BMC)

DOI 10.1186/s13063-019-4013-0 **PMID** 31948477

Abstract

BACKGROUND: Fractures of the distal radius are one of the most common osteoporotic fractures in elderly men and women. These fractures are a particular health concern amongst the elderly, who are at risk of fragility fractures, and are associated with long-term functional impairment, pain and a variety of complications. This is a sentinel event, as these fractures are associated with a two to four times increased risk of subsequent hip fractures in elderly patients. This is an important concept, as it is well established that these patients have an increased risk of falling. Fall prevention is therefore crucial to decrease further morbidity and mortality. The purpose of this study is to investigate the effect of low-magnitude high-frequency vibration (LMHFV) on postural stability and prevention of falls in elderly patients post distal radius fracture.

METHODS: This is a prospective single-blinded randomized controlled trial. Two hundred patients will be recruited consecutively with consent, and randomized to either LMHFV (n = 100) or a control group (n = 100). The primary outcome is postural stability measured by the static and dynamic ability of patients to maintain centre of balance on the Biodex Balance System SD. Secondary outcomes are the occurrence of fall(s), the health-related quality of life 36-item short form instrument, the Timed Up and Go test for basic mobility skills, compliance and adverse events. Outcome assessments for both groups will be performed at baseline (0 month) and at 6 weeks, 3 months and 6 months time points.

DISCUSSION: Previous studies have stressed the importance of reducing falls after distal radius fracture has occurred in elderly patients, and an effective intervention is crucial. Numerous studies have proven vibration therapy to be effective in improving balancing ability in normal patients; However, no previous study has applied the device for patients with fractures. Our study will attempt to translate LMHFV to patients with fractures to improve postural stability and prevent recurrent falls. Positive results would provide a large impact on the prevention of secondary fractures and save healthcare costs. **TRIAL REGISTRATION:** ClinicalTrials.gov, NCT03380884. Registered on 21 December 2017.

Language: en

Keywords

Distal radius fracture; Fall prevention; Postural stability; Randomized controlled trial; Vibration

Evaluation of time-frequency features as detectors of lack of balance due to tripping-like perturbations

Guaitolini M, Aprigliano F, Mannini A, Monaco V, Micera S, Sabatini AM. Conf. Proc. IEEE Eng. Med. Biol. Soc. 2019; 2019: 2443-2446.

(Copyright © 2019, IEEE (Institute of Electrical and Electronics Engineers))

DOI 10.1109/EMBC.2019.8857442 PMID 31946392

Abstract

Unbalancing events during gait can end up in falls and, thus, injury. Detecting events that could bring to fall and consequently activating fall prevention systems before the impact may help to mitigate related injuries. However, there is uncertainty about signals and methods that could offer the best performance. In this paper we investigated a novel trip detection method based on time-frequency features to evaluate the performances of these features as trip detectors. Hip angles of eight healthy young subjects were recorded while performing unexpected tripping trials delivered during steady locomotion. Then the Short-Time Fourier Transform (STFT) of the hip angle was estimated. Median frequency, power, centroidal frequency as well as frequency dispersion were computed for each time sliced power spectrum. These features were used as input for a trip detection algorithm. We assessed detection time (T_{detect}), specificity (Spec) and sensitivity (Sens) for each feature. Performances obtained with median frequencies over time ($T_{detect} 0.91 \pm 0.47$ s; Sens 0.96) were better than those obtained using the hip angle signal in time domain ($T_{detect} 1.19 \pm 0.27$ s; Sens 0.83). Other features did not show significant results. Thus, median frequency over time expected to achieve effective real-time event detection systems, with the aim of a future on-board application concerning detection and prevention measures.

Language: en

Fall detection for the elderly based on 3-axis accelerometer and depth sensor fusion with random forest classifier

Kim K, Yun G, Park SK, Kim DH. Conf. Proc. IEEE Eng. Med. Biol. Soc. 2019; 2019: 4611-4614.

(Copyright © 2019, IEEE (Institute of Electrical and Electronics Engineers))

DOI 10.1109/EMBC.2019.8856698 **PMID** 31946891

Abstract

In this paper, we propose a new fall detection method that combines 3-axis accelerometer and depth sensors. By combining vision and acceleration-derived features we managed to minimize the false detection rate that is considerably higher when the decision is based on just one type of feature. Also, using machine learning has led to good generalization performance. In addition, we newly created fall database that are more realistic than previous ones. Experiment results show that the proposed method can efficiently detect falls.

Language: en

Foot care to improve physical function and prevent falling of frail elderly adults with and without dementia

Yamashita T, Yamashita K, Takase Y. Conf. Proc. IEEE Eng. Med. Biol. Soc. 2019; 2019: 321-324.

(Copyright © 2019, IEEE (Institute of Electrical and Electronics Engineers))

DOI 10.1109/EMBC.2019.8857767 **PMID** 31945906

Abstract

Feet and toenail abnormalities are common among the elderly and can increase the risk of falls. We examined the changes in physical function after feet and toenails care for frail elderly adults and elderly adults with dementia. As a result, the abnormalities in the subject's feet and toenails improved, and the individuals' physical function and social participation increased.

Language: en

Optimal lighting levels for stair safety: Influence of lightbulb type and brightness on confidence, dynamic balance and stepping characteristics

Thomas NM, Skervin T, Foster RJ, O'Brien TD, Carpenter MG, Maganaris CN, Baltzopoulos V, Lees C, Hollands MA. *Exp. Gerontol.* 2020; ePub(ePub): ePub.

Affiliation

Research to Improve Stair Climbing Safety (RISCS), Faculty of Science, School of Sport and Exercise Sciences, Liverpool John Moores University, Byrom Street, Liverpool L3 3AF, United Kingdom.

(Copyright © 2020, Elsevier Publishing)

DOI 10.1016/j.exger.2020.110839 PMID 31958491

Abstract

INTRODUCTION: Poor lighting has been associated with stair falls in young and older adults. However, current guidelines for illuminating stairs seem arbitrary, differ widely between sources, and are often difficult to interpret. **AIMS:** Here we examined the influence of real-world bulb illumination properties on stair descent safety in young and older adults, with a view to generating preliminary evidence for appropriate lightbulb use/stair illumination.

METHODS: Stair tread illumination (lux) was measured in a standard UK home (2.23 m ceiling) from a low (50 W; 630 lm) and a high (103 W, 1450 lm) power compact fluorescent lamp (CFL) bulb from the time they were turned on until they reached full brightness. This enabled modelling of their illumination characteristics during warm up. Illumination was also measured from a low (40 W, 470 lm) and a high (100 W, 1521 lm) power LED bulb at first turn-on. Computer-controlled custom lighting then replicated these profiles, in addition to a Bright control (350 lx), on an instrumented staircase descended ($3 \times$ trials per light condition) by 12 young (25.3 ± 4.4 years; 5 males), 12 higher ability older (HAOA: 69.6 ± 4.7 years; 5 males) and 13 lower ability older (LAOA: 72.4 ± 4.2 ; 3 males) healthy adults. Older adults were allocated to ability groups based on physiological and cognitive function. Stair specific confidence was assessed prior to the first descent in each new lighting condition, and whole-body 3D kinematics (Vicon) quantified margins of stability and foot clearances with respect to the step edges. Mixed ANOVAs examined these measures for within-subject effects of lighting ($\times 5$), between-subject effects of age ($\times 3$) and interactions between lighting and age.

RESULTS: Use of CFL bulbs led to lower self-reported confidence in older adults (20.37%, $p = .01$), and increased margins of stability (12.47%, $p = .015$) and foot clearances with respect to the step edges (10.36%, $p = .003$). Importantly, using CFL bulbs increased foot clearance variability with respect to the bottom step (32.74%, $p = .046$), which is where a high proportion of falls occur.

CONCLUSION: Stair tread illumination from CFL bulbs at first turn on leads to less safe stair negotiation. We suggest high powered LED bulbs may offer a safer alternative.

Language: en

Keywords

Ageing; Falls risk; Illumination; Margin of stability; Stair ambulation

Pain and recurrent falls in the older and oldest-old non-institutionalized population

Gálvez-Barrón C, Formiga F, Miñarro A, Macho O, Narvaiza L, Dapena MD, Pujol R, Rodríguez-Molinero A. *BMC Geriatr.* 2020; 20(1): e15.

Affiliation

Clinical Research Unit and Department of Geriatrics, Consorci Sanitari de l'Alt Penedès i Garraf, Ronda Sant Camil s/n, Sant Pere de Ribes, 08810, Barcelona, Spain.

(Copyright © 2020, Holtzbrinck Springer Nature Publishing Group - BMC)

DOI 10.1186/s12877-020-1412-8 **PMID** 31937248

Abstract

BACKGROUND: Recurrent falls represent a priority in geriatric research. In this study we evaluated the influence of pain as a risk factor for recurrent falls (two or more in 1 year) in the older (65-79 years) and oldest-old (80 or more years) non-institutionalized population.

METHODS: Prospective cohort study. 772 non-institutionalized individuals with ages of 65 years or older (with overrepresentation of people aged 80 years or older [n = 550]) were included through randomized and multistage sampling, stratified according to gender, geographic area and habitat size. Basal evaluation at participant's home including pain evaluation by Face Pain Scale (FPS, range 0-6) and then telephonic contact every 3 months were performed until complete 12 months. Multivariate analysis by logistic regression (recurrent falls as outcome variable) for each age group (older and oldest-old group) were developed considering pain as a quantitative variable (according to FPS score). Models were adjusted for age, gender, balance, muscle strength, depressive symptoms, cognitive decline, number of drugs and number of drugs with risk of falls.

RESULTS: 114 (51.35%) and 286 (52%) participants of older and oldest-old group, respectively, reported pain; and recurrent falls occurred in 6.93% (n = 12) of the older group and 12.06% (n = 51) of the oldest-old group. In the older group, pain was associated with recurrent falls, with an associated odds ratio (OR) of 1.47 (95% CI 1.08-2.00; beta 0.3864) for each unit increase in pain intensity (thus, participants with the most severe pain [FPS 6] had OR of 10.16 regarding to participants without pain [FPS 0]). In the oldest-old group, pain was not associated with recurrent falls.

CONCLUSIONS: Pain, a potentially modifiable and highly prevalent symptom, is a risk factor for recurrent falls in the older people (65-79 years). However, we have not been able to demonstrate that this relationship is maintained in the oldest-old population (80 or more years).

Language: en

Keywords

Falls; Oldest-old people; Risk factors

Pre-impact detection algorithm to identify lack of balance due to tripping-like perturbations

Aprigliano F, Guaitolini M, Sabatini AM, Micera S, Monaco V. Conf. Proc. IEEE Eng. Med. Biol. Soc. 2019; 2019: 2430-2433.

(Copyright © 2019, IEEE (Institute of Electrical and Electronics Engineers))

DOI 10.1109/EMBC.2019.8856383 **PMID** 31946389

Abstract

This study investigates the performance of an updated version of our pre-impact detection algorithm while parsing out hip kinematics in order to identify unexpected tripping-like perturbations during walking. This approach grounds on the hypothesis that due to unexpected gait disturbances, the cyclic features of hip kinematics are suddenly altered thus promptly highlighting that the balance is challenged. To achieve our goal, hip angles of eight healthy young subjects were recorded while they were managing unexpected tripping trials delivered during the steady locomotion.

RESULTS showed that the updated version of our pre-impact detection algorithm allows for identifying a lack of balance due to tripping-like perturbations, after a suitable tuning of the algorithm parameters. The best performance is represented by a mean detection time ranging within 0.8-0.9 s with a low percentage of false alarms (i.e., lower than 10%). Accordingly, we can conclude that the proposed strategy is able to detect lack of balance due to different kinds of gait disturbances (e.g., slippages, tripping) and that it could be easily implemented in lower limb orthoses/prostheses since it only relies on joint angles.

Language: en

Prevalence and related factors of depression and falls among the elderly living in rural communities of Guangzhou

Lin WQ, Huang TY, Liu L, Yang YO, Li YH, Sun MY, Qin FJ, Yang QY, Shen JC. *Psychol. Health Med.* 2020; ePub(ePub): ePub.

Affiliation

Department of Basic Public Health, Center for Disease Control and Prevention of Guangzhou, Guangzhou, China.

(Copyright © 2020, Informa - Taylor and Francis Group)

DOI 10.1080/13548506.2020.1714064 PMID 31967487

Abstract

Few studies have concentrated on the prevalence and related factors of depression and falls among the elderly living in rural communities of Guangzhou. A total of 335 participants aged ≥ 60 years were recruited by simple random sampling method. A structural equation model was applied to determine interrelationships between depression, falls and other variables. As high as 27.5% and 23.3% participants had reported depressive symptoms and falls, respectively. The path analysis showed the total effect ($\beta = -0.58$) of depression on quality of life (QOL) consisted of a direct effect ($\beta = -0.51$) and an indirect effect ($\beta = -0.07$), which was mediated by family function and number of falls, and the R^2 was 0.36. The model fit indices were $\chi^2/df = 1.096$, $P > 0.05$, Root Mean Square Error of Approximation (RMSEA) = 0.017, Tucker-Lewis Index (TLI) = 0.998 and Comparative Fit Index (CFI) = 0.999. Depression and falls were prevalent among the elderly living in rural communities of Guangzhou city. Pay attention to strengthen family function and prevent falls may prevent depression and improve the QOL among the elderly.

Language: en

Keywords

Depression; Family function; Mediator; Number of falls; Quality of life

Quantitative and qualitative analyses of the clock drawing test in fall and non-fall patients with Alzheimer's disease

Suzuki Y, Mochizuki H, Oki M, Matsumoto M, Fukushima M, Yoshikawa Y, Nagasawa A, Takakura T, Shimoda N. *Dement. Geriatr. Cogn. Dis. Extra* 2019; 9(3): 381-388.

Affiliation

Department of Rehabilitation, Faculty of Health Sciences, Tokyo Kasei University, Saitama, Japan.

(Copyright © 2019, Karger Publishers)

DOI 10.1159/000502089 PMID 31966036

Abstract

AIM: The clock drawing test (CDT) is widely used as a visual spatial ability test and screening test for dementia patients. The appearance frequency of qualitative errors obtained through the qualitative analysis of CDT may be related to the participant's falls. The aim of this study was to clarify the difference in the number of people who presented with qualitative errors in the CDT between a fall and non-fall group of patients with Alzheimer's disease (AD).

METHODS: The CDT was implemented for 47 patients with AD. A quantitative analysis was conducted, and a qualitative analysis was performed for errors. The patients were divided into two groups based on their history of falls over the past year. The results of the CDT quantitative analysis were tested using the Mann-Whitney U test, and Fisher's exact test was employed to determine the difference in the number of people who presented with error types between the two groups (fall group, non-fall group) in the CDT qualitative analysis.

RESULTS: In the quantitative analysis, a significant difference was found for the total scores, with the total CDT score of the fall group ($n = 22$) significantly lower than that of the non-fall group ($n = 25$) ($p = 0.006$, effect size: $\phi = 0.40$). In the qualitative analysis, a significantly higher number of patients in the fall group than in the non-fall group presented with a conceptual deficit ($p = 0.001$, $\phi = 0.51$). No differences were found in the number of patients in the two groups who presented with the other five error types.

CONCLUSIONS: These results showed that a lower score in the CDT quantitative analysis might suggest an increased risk of falls. It was also clarified that a larger number of patients in the fall group than in the non-fall group presented with a conceptual deficit of the qualitative error types in the CDT. Therefore, these results suggest that the appearance of a conceptual deficit may be an index for the selection of patients with AD prone to falling when implementing fall prevention measures.

Language: en

Keywords

Alzheimer's disease; Clock drawing test; Fall; Qualitative analysis

Reliability of the Balance Quality Tester (BQT) for balance quality measurement

Rahhal M, Chkeir A, Nassereddine M, Atieh M, Soubra R. Conf. Proc. IEEE Eng. Med. Biol. Soc. 2019; 2019: 3738-3741.

(Copyright © 2019, IEEE (Institute of Electrical and Electronics Engineers))

DOI 10.1109/EMBC.2019.8856593 PMID 31946687

Abstract

Balance quality measurement is a key element in the evaluation of numerous conditions, including frailty. Four parameters were extracted from the balance quality assessment for older subjects: Rising Rate (RR), Duration of the stabilization segment (ZD), Stabilogram Area (SA) and Average Velocity of the Trajectory (TV). These are then scored and weighted, thus creating an overall indicator of balance quality. The reliability, the absolute reliability and the minimum difference of the four parameters were evaluated using the intra-class correlation coefficient (ICC), the standard error measurement (SEM) and the Minimal Detectable Change (MDC), respectively. Reproducibility was very high, with ICC values of 0.83, 0.85, 0.88 and 0.95 for RR, ZD, SA and TV, respectively. These results revealed that the parameters are a reliable measure for evaluating balance quality measurement.

Language: en

Risk factors for falls in older adults experiencing homelessness: results from the HOPE HOME Cohort Study

Abbs E, Brown R, Guzman D, Kaplan L, Kushel M. J. Gen. Intern Med. 2020; ePub(ePub): ePub.

Affiliation

Center for Vulnerable Populations, University of California, San Francisco, UCSF Box 1364, San Francisco, CA, 94143, USA. margot.kushel@ucsf.edu.

(Copyright © 2020, Holtzbrinck Springer Nature Publishing Group)

DOI 10.1007/s11606-020-05637-0 **PMID** 31965522

Abstract

BACKGROUND: More than half of homeless adults are of age ≥ 50 years. Falls are a common cause of morbidity in older adults in the general population. Risk factors for falls in the general population include poor health, alcohol use, and exposure to unsafe environments. Homeless adults aged ≥ 50 have a high prevalence of known risk factors and face additional potential risks.

OBJECTIVES: To examine the prevalence of and risk of falling in a cohort of older homeless adults.

DESIGN: Longitudinal cohort study with participant interviews every 6 months for 3 years; data were analyzed using generalized estimating equations (GEEs). **PARTICIPANTS:** Three hundred fifty adults aged ≥ 50 , homeless at study entry, recruited via population-based sampling. **MEASURES:** The dependent variable is any falls in prior 6 months; independent variables include individual (i.e., illness, behaviors) and social/environmental (i.e., social support, experiencing violence, living unsheltered) factors.

RESULTS: Over three quarters of participants were men (77.1%) and Black (79.7%). The median age was 58 (IQR 54, 61). At baseline, one third (33.7%) reported a fall in the prior 6 months. At follow-up visits, 23.1% to 31.2% of participants reported having fallen. In GEE models, individual risk factors (non-Black race, being a women, older age, functional impairment, urinary incontinence, history of stroke, and use of assistive devices, opioid, and marijuana) were associated with increased odds of falls. Environmental and social factors (spending any nights unsheltered (adjusted odds ratio (AOR) = 1.42, CI = 1.10-1.83) and experiencing physical assault (AOR = 1.67, CI = 1.18-2.37) were also associated.

CONCLUSIONS: Older homeless adults fall frequently. Likely contributors include having a high prevalence of conditions that increase the risk of falls, compounded by heightened exposure to unsafe environments. Fall prevention in this population should target those at highest risk and address modifiable environmental conditions. Providing shelter or housing and addressing substance use could reduce morbidity from falls in homeless older adults.

Language: en

Keywords

falls; homelessness; vulnerable populations

Screening for high hip fracture risk does not impact on falls risk: a post hoc analysis from the SCOOP study

Condurache CI, Chiu S, Chotiyarnwong P, Johansson H, Shepstone L, Lenaghan E, Cooper C, Clarke S, Khioe RFS, Fordham R, Gittoes N, Harvey I, Harvey NC, Heawood A, Holland R, Howe A, Kanis JA, Marshall T, O'Neill TW, Peters TJ, Redmond NM, Torgerson D, Turner D, McCloskey E. *Osteoporos. Int.* 2020; ePub(ePub): ePub.

Affiliation

Centre for Metabolic Diseases, University of Sheffield Medical School, Beech Hill Road, Sheffield, S10 2RX, UK. e.v.mccloskey@sheffield.ac.uk.

(Copyright © 2020, Holtzbrinck Springer Nature Publishing Group)

DOI 10.1007/s00198-019-05270-6 PMID 31960099

Abstract

A reduction in hip fracture incidence following population screening might reflect the effectiveness of anti-osteoporosis therapy, behaviour change to reduce falls, or both. This post hoc analysis demonstrates that identifying high hip fracture risk by FRAX was not associated with any alteration in falls risk.

INTRODUCTION: To investigate whether effectiveness of an osteoporosis screening programme to reduce hip fractures was mediated by modification of falls risk in the screening arm.

METHODS: The SCOOP study recruited 12,483 women aged 70-85 years, individually randomised to a control (n = 6250) or screening (n = 6233) arm; in the latter, osteoporosis treatment was recommended to women at high risk of hip fracture, while the control arm received usual care. Falls were captured by self-reported questionnaire. We determined the influence of baseline risk factors on future falls, and then examined for differences in falls risk between the randomisation groups, particularly in those at high fracture risk.

RESULTS: Women sustaining one or more falls were slightly older at baseline than those remaining falls free during follow-up (mean difference 0.70 years, 95%CI 0.55-0.85, $p < 0.001$). A higher FRAX 10-year probability of hip fracture was associated with increased likelihood of falling, with fall risk increasing by 1-2% for every 1% increase in hip fracture probability. However, falls risk factors were well balanced between the study arms and, importantly, there was no evidence of a difference in falls occurrence. In particular, there was no evidence of interaction ($p = 0.18$) between baseline FRAX hip fracture probabilities and falls risk in the two arms, consistent with no impact of screening on falls in women informed to be at high risk of hip fracture.

CONCLUSION: Effectiveness of screening for high FRAX hip fracture probability to reduce hip fracture risk was not mediated by a reduction in falls.

Language: en

Keywords

FRAX; Falls; Fractures; Older women; Osteoporosis; Screening

Use of wearable technology to quantify fall risk in psychogeriatric environments: a feasibility study

Mertens M, Raepsaet J, Debard G, Mondelaers M, Vanrumste B, Davis J. Conf. Proc. IEEE Eng. Med. Biol. Soc. 2019; 2019: 3187-3190.

(Copyright © 2019, IEEE (Institute of Electrical and Electronics Engineers))

DOI 10.1109/EMBC.2019.8856337 PMID 31946565

Abstract

Fall incidents with elderly suffering from psychological pathologies, in combination with a comorbidity of clinical problems are highly prevalent. In our research setting, the psychiatric hospital OPZ in Geel, Belgium, 1790 fall incidents were recorded with 283 patients since 2013. The nature of the patients' profiles makes a valid, objective fall risk assessment very difficult; for them, instructions to perform the tests are difficult to understand and execute. Therefore, the currently used instruments are not suited for this complex situation. In this study we propose an alternative system for the assessment of fall risk for patients of a psychogeriatric ward. We also study the essential precautions needed for acceptance of wearables in this complex setting. We collected individual daily mean gait speeds of 17 patients at a psychogeriatric ward over a period of five months. We show that it is possible, using wearable technology, to measure individual gait speed. We also show that it is possible to have the wearable technology accepted by the target group. The results obtained so far are promising to use automatical gait measurement to correlate to the currently used risk assessment tests and to eventually replace these tests.

Language: en

Anticipatory and compensatory postural responses during perturbed standing in individuals with traumatic brain injury

Pilkar R, Ibrionke O, Ehrenberg N, Nolan KJ. Conf. Proc. IEEE Eng. Med. Biol. Soc. 2019; 2019: 5080-5083.

(Copyright © 2019, IEEE (Institute of Electrical and Electronics Engineers))

DOI 10.1109/EMBC.2019.8857851 PMID 31947001

Abstract

Anticipatory postural adjustments (APA) and compensatory postural adjustments (CPA) are neuromuscular responses generated to stabilize the body and achieve balance during perturbations. The impaired sensory integration after a traumatic brain injury (TBI) can limit the ability to perceive perturbations and potentially affect the ability to generate APA and CPA responses. The main objective of this investigation is to explore the existence of APA and CPA generation in tibialis anterior (TA) and gastrocnemius (GAST) muscles during base of support perturbations in healthy controls (HC) as well as individuals with TBI. The secondary objective is to explore the effectiveness of a novel computerized biofeedback based intervention (CBBI) at improving APA and CPA responses in individuals with TBI. We observed that all three groups - HC (n=5), TBI-control (n=5), and TBI-Intervention (n=4) showed the presence of only CPA responses for the TA muscle, however, these responses were longer and variable for both TBI groups, compared to the short and consistent responses of the HC group. The GAST was involved in both APA and CPA for all groups. After the 4-week CBBI period, the TBI-I group showed increased APA responses for both TA and GAST. Further, the TBI-I group showed reduced CPA responses for both TA and GAST after the intervention. The elevated and longer CPA responses of TA and GAST and lower APA responses of GAST could suggest impaired postural control. Due to their significance and potential link to the balance dysfunction, these mechanisms need to be studied comprehensively in larger samples in order to effectively optimize the rehabilitation approaches for improving balance and avoiding falls in individuals with TBI.

Language: en

Balance disorder, falling risks and fear of falling in obese individuals: cross-sectional clinical research in Isparta

Ercan S, Başkurt Z, Başkurt F, Cetin C. J. Pak. Med. Assoc. 2020; 70(1): 17-23.

Affiliation

Department of Sports Medicine, Suleyman Demirel University, Isparta, Turkey.

(Copyright © 2020, Pakistan Medical Association)

DOI 10.5455/JPMA.293668 **PMID** 31954018

Abstract

OBJECTIVE: To examine the effect of obesity according to gender on balance, posture, the risk of falling and the fear of falling.

METHODS: The cross-sectional study was conducted at the Department of Sports Medicine, Suleyman Demirel University, Isparta, Turkey, from December 2016 to June 2017, and comprised individuals aged 40-60 years who were divided into obese and non-obese groups based on their body mass index values. Demographic data was recorded before collecting target data using Tinetti Falls Efficacy Scale, Activities-Specific Balance Confidence Scale, History of Falls Scale, Single Leg Stance Test, Functional Reach Test and the New York Posture Rating Test. SPSS 20 was used for data analysis.

RESULTS: Of the 251 subjects, 129(51.4%) were females and 122(48.6%) were males. The obese group had 125(49.8%) subjects. There was a significant difference between the history of stumbling in obese males and the history of stumbling and falls in obese females ($p<0.05$). A high restriction in activity was determined in obese females because of fear of falling ($p<0.05$). There was impaired posture in all 125(100%) obese individuals and they had all experienced loss of balance. Despite loss of balance and impaired posture in obese males, they did not experience fear of falling and no difference was determined in confidence ($p>0.05$). Fear of falling was high in obese females and confidence in daily activities was low ($p<0.05$). Significant negative relationship was found among body mass index, loss of balance and poor posture ($p<0.05$). No significant relationship was determined in males between obesity and Tinetti Falls Efficacy Scale and Activities-Specific Balance Confidence Scale scores ($p>0.05$).

CONCLUSIONS: Obesity causes loss of balance and posture. However, despite functional losses in obese males, as there was no fear of falling and a deceptive sense of confidence, this prevented prediction of the risk of falling.

Language: en

Keywords

Obesity, Balance, Posture, Risk of fall, Fear of fall

Cortical reactive balance responses to unexpected slippages while walking: a pilot study

Mezzina G, Aprigliano F, Micera S, Monaco V, Venuto D. Conf. Proc. IEEE Eng. Med. Biol. Soc. 2019; 2019: 6868-6871.

(Copyright © 2019, IEEE (Institute of Electrical and Electronics Engineers))

DOI 10.1109/EMBC.2019.8856925 PMID 31947418

Abstract

Understanding how the human brain cortex behaves when the dynamical balance is unexpectedly challenged can be useful to enable fall prevention strategies during daily activities. In this respect, we designed and tested a novel methodological approach to early detect modifications of the scalp-level signals when steady walking is perturbed. Four young adults were asked to manage unexpected bilateral slippages while steadily walking at their self-selected speed. Lower limb kinematics, electromyographic (EMG) and electroencephalographic (EEG; 13 channels from motor and sensory-motor cortex areas) signals were synchronously recorded. EMG signals from Vastus Medialis (both sides) were used to trigger the analysis of the EEG before and after the perturbation onset. Cortical activity was then assessed and compared pre vs. post perturbation. Specifically, for each gait cycle, the rate of variation of the EEG power spectrum density, named m , was used to describe the cortical responsiveness in five bands of interests: θ (4-7 Hz), α (8-12 Hz), β I, β II, β III rhythms (13-15, 15-20, 18-28 Hz).

RESULTS revealed a sharp increment of m early after the onset of the perturbation (perturbed step) compared to steady locomotion, for all rhythms. This cortical behavior disappeared during the recovery step. This study promisingly supports the evidence that the proposed approach can distinguish between steady walking and early reactive balance recovery, paving the way for the EEG-based monitoring of the fall risk during daily activities.

Language: en