Who will fall in the next three months? Screening fall risk in healthy older persons

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Bet et al. (2020). Gerontechnology 19(suppl); https://doi.org/10.4017/gt.2020.19.s.69872

Purpose The high prevalence of falls and the postural instability syndrome require deeper preventive screening (Pitchai et al., 2019). There are functional tests that measure the fall risk in older persons, however, their sensitivity to populations considered active and healthy is not significant (Bet et al., 2019). Therefore, an alternative would be to analyze gait using features extracted from inertial sensors, which were more sensitive to this function (Ponti et al., 2017). The objective of this study is to investigate patterns obtained from an acceleration sensor to screen fall risk in older persons through variations of the Timed Up and Go (TUG) test. **Method** In this prospective designed study, 73 non-fallers and community-dwelling older persons, participants of the University of the Third Age in São Carlos, SP, Brazil (representative sample with error=5% and power=90%), performed three variations of the TUG: a) simple TUG, b) motor TUG, c) dual-task TUG; wearing an accelerometer on the waist. After collecting the data, each volunteer received calls every three months for one year to check for occurrence of falls. Features based on entropy, frequency, and amplitude of the signal were extracted to investigate which gait characteristics would allow differentiating the elderly who had a fall in the 12 months from those who did not. A t-test was employed to compare the variables according to the groups. **Results** The average age of the sample was 70 years, 56% females. Table 1 summarizes the features that were different statistically between the groups during the period of follow up. After three months, seven volunteers suffered a fall and seven accelerometry features were different between the groups. Eight volunteers suffered a fall in the period between three and six months and two features were different between the fallers and non-fallers. Between six and nine months, two elderly reported falls and just one feature was statistically different. Seven volunteers between nine and twelve months reported falls, and none features were different between the groups. **Conclusions** These results showed that the features can better discriminate fallers than non-fallers in the period of three months before the fall occurrence. The results for six, nine and twelve months were not as representative when compare the results for three months.

References

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Keywords: accelerometer, gait analysis, fall risk, wearable sensors, elderly.
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Table 1. 12-months follow-up features that produced statistical difference when comparing the means of the faller and non-faller groups.

	non-fallers	fallers	p-value
Three months			
n	66	7	
PSE	6.905±2.075	7.931±0.792	**0.035**
PSP1	5.038±1.030	4.307±0.681	**0.037**
PSP2	1.530±0.977	2.408±0.740	**0.026**
PSP3	0.589±0.452	1.355±0.728	**0.003**
PSPF1	9.818±1.922	8.000±3.891	**0.043**
PSPF2	13.121±8.289	7.429±4.271	**0.025**
WPSP	44.700±12.916	30.435±18.802	**0.011**
Six months			
n	65	8	
WPSP	44.182±14.218	36.424±12.272	**0.038**
TC	0.343±0.420	0.141±0.164	**0.046**
Nine months			
n	71	2	
PSP2	1.568±0.961	3.255±0.534	**0.021**