FALL RISK SIGNATURE IN BRAZILIAN OLDER WOMEN AND BALANCE ASSESSMENT USING A MOBILE TECHNOLOGY

Tahara, A.K[1].; Barbora, A.[2]; Barbosa, M.A.[2]; Nunes, G.S.[2]; Oliveira, C.[2]; Souza, M.A.[3] Ferreira, I.[3]; Andrade, D.

[1]Physiotherapist, MSc Student in Rehabilitation Sciences - UFJF/Brazil (klein.tahara@gmail.com)

[2]Physiotherapist, MSc, PhD - UFJF/Brazil

[3]Physical therapy students –UFJF/Brazil

BACKGROUD/RATIONALE

Falls in elderly → Major role in injury → Disability

PURPOSE

To characterize high fall-risk group and its correlation with the YMED balance test app

- ✓ Characteristics of high fall-risk groups and its relation with more available tools of assessment of fall risk are important aspects of *effective fall prevention programs*

METHODS

VOLUNTEERS AND PROCEDURES

- ✓ Thirty-five volunteers as follow:

  High fall-risk (HFR – N= 17)
  Non fall-risk (NFR – N=18)

- ✓ Were submitted to the hip's Limits of Stability (LoS) test

  On a force plate

  To evaluate ten stabilometric parameters (SP).

STATISTICS

- ✓ The differences between groups were assessed by Mann-Whitney test
- ✓ The fall-risk signatures were analyzed applying the overall profile analysis, using the concept of low and high-postural sway

RESULTS

- ✓ In general, HFR individuals had an opposite fall-risk signature compared to NFR.
- ✓ The high fall-risk signature was characterized by a lack of anterior-posterior voluntary sway and a high medium-lateral sway during LoS test.
- ✓ Interestingly, the YMED was able to distinguish the HFR and NFR under LoS test.

CONCLUSIONS

The innovative fall-risk signature suggest that the risk of falls are *multifactorial phenomena* associated with a *high fear of falls* and *low stability* and the cheap available fall-risk assessment tool is essential to *prevention and early detection of fall-risk*.

THANK YOU

klein.tahara@gmail.com

REFERENCES

1. Vieira ER, Palmer RC, Chaves PHM. Prevention of falls in older people living in the community. *BMJ*. 2016;353:i1419.
2. Heinrich S, Rapp K, Rissmann U, Becker C, König H-H. Cost of falls in old age: a systematic review. *Osteoporos Int*. 2010;21(6):891-902.
3. Ambrose AF, Paul G, Hausdorff JM. Risk factors for falls among older adults: A review of the literature. *Maturitas*. 2013;75(1):51-61.
4. Chang VC, Do MT. Risk Factors for Falls Among Seniors: Implications of Gender. *Am J Epidemiol*. 2015;181(7):521-531.
5. Jalali MM, Gerami H, Heidarzadeh A, Soleimani R. Balance performance in older adults and its relationship with falling. *Aging Clin Exp Res*. 2015;27(3):287-296.
6. Landers MR, Oscar S, Sasaoka J, Vaughn K. Balance Confidence and Fear of Falling Avoidance Behavior Are Most Predictive of Falling in Older Adults: Prospective Analysis. *Phys Ther*. 2016;96(4):433-442.
7. Rodrigues Barral ABC, Nahas EAP, Nahas-Neto J, Cangussu LM, Buttros D de A. Effect of hormone therapy on postural balance in postmenopausal women. *Menopause J North Am Menopause Soc*. 2012;19(7):768-775.
8. Siqueira FV, Facchini LA, Silveira DS da, et al. Prevalence of falls in elderly in Brazil: a countrywide analysis. *Cad Saude Publica*. 2011;27(9):1819-1826.
9. Abreu DR de OM, Azevedo RC de S, Silva AMC da, Reiners AAO, Abreu HCA. Factors associated with recurrent falls in a cohort of older adults. *Cien Saude Colet*. 2016;21(11):3439-3446.
10. Valentine RJ, Misic MM, Rosengren KS, Woods JA, Evans EM. Sex impacts the relation between body composition and physical function in older adults. *Menopause*. 2009;16(3):518-523.
11. Scaglioni-Solano P, Aragón-Vargas LF. Gait characteristics and sensory abilities of older adults are modulated by gender. *Gait Posture*. 2015;42(1):54-59.
12. Cummings SR, Melton LJ. Epidemiology and outcomes of osteoporotic fractures. *Lancet*. 2002;359(9319):1761-1767.
13. Goble DJ, Hearn MC, Baweja HS. Combination of BTrackS and Geri-Fit as a targeted approach for assessing and reducing the postural sway of older adults with high fall risk. *Clin Interv Aging*. 2017;12:351-357.
14. O'Connor SM, Baweja HS, Goble DJ. Validating the BTrackS Balance Plate as a low cost alternative for the measurement of sway-induced center of pressure. *J Biomech*. 2016;49(16):4142-4145.
15. Bauer C, Gröger I, Rupprecht R, Gaßmann KG. Intrasession Reliability of Force Platform Parameters in Community-Dwelling Older Adults. *Arch Phys Med Rehabil*. 2008;89(10):1977-1982.
16. Bauer C, Gröger I, Rupprecht R, Meichtry A, Tibesku CO, Gaßmann KG. Reliability analysis of time series force plate data of community dwelling older adults. *Arch Gerontol Geriatr*. 2010;51(3).
17. Pizzigalli L, Micheletti Cremasco M, Mulasso A, Rainoldi A. The contribution of postural balance analysis in older adult fallers: A narrative review. *J Bodyw Mov Ther*. 2016;20(2):409-417.
18. Park JW, Jung M, Kweon M. The Mediolateral CoP Parameters can Differentiate the Fallers among the Community-dwelling Elderly Population. *J Phys Ther Sci*. 2014;26(3):381-384.
19. Muir JW, Kiel DP, Hannan M, Magaziner J, Rubin CT. Dynamic parameters of balance which correlate to elderly persons with a history of falls. Kado D, ed. *PLoS One*. 2013;8(8):e70566.
20. Young WR, Mark Williams A. How fear of falling can increase fall-risk in older adults: Applying psychological theory to practical observations. *Gait Posture*. 2015;41(1):7-12.
21. Binda SM, Culham EG, Brouwer B. Balance, muscle strength, and fear of falling in older adults. *Exp Aging Res*. 2003;29(2):205-219.
22. Newton RA. Validity of the multi-directional reach test: a practical measure for limits of stability in older adults. *J Gerontol A Biol Sci Med Sci*. 2001;56(4):M248-52.
23. Faraldo-García A, Santos-Pérez S, Crujeiras R, Soto-Varela A. Postural changes associated with ageing on the sensory organization test and the limits of stability in healthy subjects. *Auris Nasus Larynx*. 2016;43(2):149-154.
24. Kurz I, Oddsson L, Melzer I. Characteristics of balance control in older persons who fall with injury – A prospective study. *J Electromyogr Kinesiol*. 2013;23(4):814-819.
25. Goble DJ, Manyak KA, Abdenour TE, Rauh MJ, Baweja HS. An initial evaluation of the btracks balance plate and sports balance software for concussion diagnosis. *Int J Sports Phys Ther*. 2016;11(2):149-155.
26. Levy SS, Thralls KJ, Kviatkovsky SA. Validity and Reliability of a Portable Balance Tracking System, BTrackS, in Older Adults. *J Geriatr Phys Ther*.
27. Riemann BL, Guskiewicz KM, Shields EW. Relationship between Clinical and Forceplate Measures of Postural Stability. *J Sport Rehabil*. 1999;8(2):71-82.
28. Riemann BL, Guskiewicz KM. Effects of mild head injury on postural stability as measured through clinical balance testing. *J Athl Train*. 2000;35(1):19-25.
29. Patil R, Uusi-Rasi K, Kannus P, Karinkanta S, Sievänen H. Concern about falling in older women with a history of falls: Associations with health, functional ability, physical activity and quality of life. *Gerontology*. 2013;60(1):22-30.
30. Camargos FFO, Dias RC, Dias JMD, Freire MTF. Cross-cultural adaptation and evaluation of the psychometric properties of the Falls Efficacy Scale-International Among Elderly Brazilians (FES-I-BRAZIL). *Rev Bras Fisioter*. 14(3):237-243.
31. Adkin AL, Frank JS, Carpenter MG, Peysar GW. Fear of falling modifies anticipatory postural control. *Exp Brain Res*. 2002;143(2):160-170.
32. Roemer K, Raisbeck L. Temporal dependency of sway during single leg stance changes with age. *Clin Biomech*. 2015;30(1):66-70.
33. Horak FB, Nashner LM. Central programming of postural movements: adaptation to altered support-surface configurations. *J Neurophysiol*. 1986;55(6):1369-1381.
34. Ueta K, Okada Y, Nakano H, Osumi M, Morioka S. Effects of Voluntary and Automatic Control of Center of Pressure Sway During Quiet Standing. *J Mot Behav*. 2015;47(3):256-264.