“The profile of postural control in elderly through traditional methods”

Furtado, S.[1]; Raimundo, A.[2]; Fernandes, O [1].;

1- University of Évora. Portugal; 2- University of Évora. Research Centre of Sports, Health and Human Development. Portugal

Introduction

"The objective of this study was evaluate and characterize the behavior of center-of-pressure (CoP) during postural control between a group of healthy elderly adults with structure physical activity and a group of healthy elderly adults without structure physical activity.

The postural control was assessed during body swain in quasi-static upright posture under both eyes-open (EO) and eyes-close (EC) conditions.

Postural dyscontrol in the elderly may reflect subclinical pathologies affecting one or more components of the postural control system, as well as age-related changes in the sensorimotor systems.

Characterize physical activities-related changes in postural steadiness will advance our understanding of the ways in which the postural control system is compromised with the physical activities process, and may provide useful information in identifying task to minimize elderly persons at risk of falling."

Methods

Population: 75 healthy elderly (mean age 68 6 years, range 61-83), 23 Male ,52 female; non fallers, 40 elements are regular practitioners of a structured physical activity program (45 min, 2x week, level moderate- IPAQ) and 35 elements are not engaged in structured physical activity.

Instruments:

Structured interview to acess exclusion criteria (characterization of the past medical history- physical, neurological, phychological and metabolic problems; use of medication; acess number of falls in the previous year and apply IPAQ- international physical activity questionnaire)

Forceplate**-** Each subjects was asked to stand quietly in a comfortable position on a Bertec (FP4060-10) force plate at sample frequency of 1000Hz. For this analysis, the original time series were down sampled to 100Hz with MATLAB® routines. Analogue signals were filtered with a zero-lag second-order Butterworth low-pass filter at 5-Hz cut-off frequency. Center of pressure (COP) displacements were computed in the antero-posterior (AP) and medio-lateral (ML) directions and all the variables was computed." The variables analyzed were the total displacement of the oscillation (TOTEX), root mean square (RMS) amplitude of displacement (ACP), Mean Velocity (MV), Total Mean velocity (TMV), Area, Mean Frequency (MF) and analysis of frequency spectral peak frequency, frequency at 50% of the power spectrum and 80% of the power spectrum. The data were processed in SPSS 15, using the methodology of descriptive analysis and comparison of groups according to the practice or no practice of physical exercise with eyes open (EO) and eyes closed (EC), practice specific activities and fitness level, p <.05

Rating: Height (setting the reference point, 1,5m); Base of Support(position of the feet and malleoli in comfortable position)

Tests:
3 trials with EO-two-legged quiet stance; 2 trials with EC-two-legged quiet stance;
Time: 60 sec 0 ; Rest: EO-whenever requested; EC-30sec 0

Position (fig.2): Arms crossed over the chest and feet with the position of the markings.

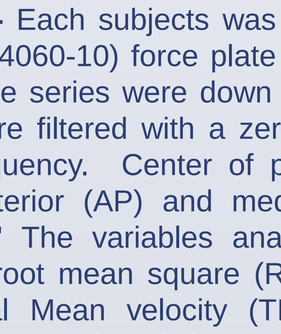

Figure 1 - Marking Base of support

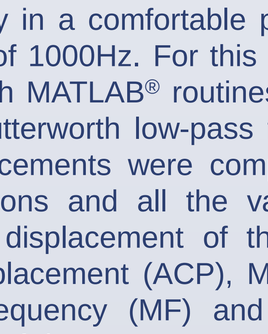

Figure 2- Position

Abbreviations- EO= Eyes Open; EC- Eyes closed
PA= Physical Activity; PE= Physical Exercise
P- Practitioners; NP- non Practitioners

Results

Table 1- Significant results from the application of t test for equality of means between practitioners and non practitioners, provided Eyes Open (EO) and Eyes Closed (EC);

	Sig. (2 tailed) p<0,05
TOTEX EC	.013
RMS ml EC	.006
ACP ml EC	.013
Area ml EC	.007
MF ml EC	.008
F80 ml EC	.002

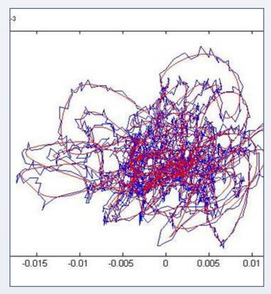

Fig. 3- Original time series(blue) and downsample and filtered time series (red) of 77 years NP

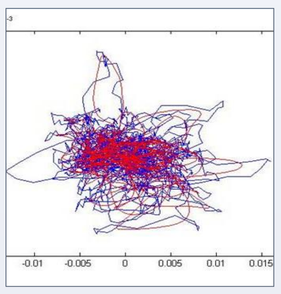

Fig. 4- Original time series(blue) and downsample and filtered time series (red) of 76 years P

Table 2- Resume variables differences between samples Practitioners (P) and non Practitioners (NP), Eyes Closed (EC); ML- medio lateral plane;

Variables	Differences
TOTEX	↑ NP 2th trial EC
RMS	NO ≠
ACP	↑ NP; >≠ ML
AREA	↑ NP (ML)
MV	↑ NP (EC)
TMV	↑ NP (EC)
MFO	↑ P EC (ML)
Fpico	≠ Minimal
F50%	↑ P EC (ML)
F80%	↑ P EC (ML)

Conclusions

After data analysis it is concluded that significant differences (p<.05) exist between Eyes open / Eyes closed, in measures of medio lateral oscillation between practice and non practice of Physical Exercise in total displacement of oscillation-TOTEX, the amplitude of the displacement ACP ml, in Area ml, the MV EC (Eyes Closed), TMV EC (Eyes Closed) at Mean Frequency EC and F50%,F80% spectral frequency EC. This last results are higher at the practitioners that evidence postural adjustments ability.

The practice of Tai Chi, the practice of exercises on uneven surfaces and level of PA appear to influence the profile of postural control in the elderly, with significant results when compare the practitioners and non practitioners.

Future research

To investigate the influence of different structured programs of physical activity, using the same variables of centre of pressure, with general characteristics and with specific activities of sensorimotor training, on the risk of falls in the elderly.

Figure 3- Specific activities of postural control

References

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Contacts: Sofia Furtado; e-mail: sofia_furtado@hotmail.com; phone:+351966099451 Portugal