C7

Effect of physical activity on balance

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1. Introduction

Aim of this study is to verify if physical activity can influence postural control and balance in healthy subjects, through an easily-applicable protocol.

2. Methods

Setting: laboratory of analysis of movement. *Participants*: 20 healthy sportsmen of competitive level (age 23 ± 4, height 173 ± 10 cm, weight 65 ± 11 kg) and 20 healthy sedentary subjects (age 25 ± 4, height 175 ± 9 cm, weight 68 ± 11 kg). *Materials*: three different conditions have been taken into consideration: stance (BIP), one-leg stance (on the dominant limb) (MON), and one-leg stance (on the dominant limb) but with joint knees and hands behind the back (MON VINC). For each one of these three conditions, three trials with open eyes (marked with ''OO'') and three trials with closed eyes (marked with ''XX'') have been acquired, spaced out. Each trial lasted 25 s. They were performed on a force platform Kistler 9682A, whose data were acquired by a 100 Hz frequency. Nine markers were placed on each subject, corresponding to: left and right heel, left and right I metatharse, left and right V metatharse, left and right II foot-finger, and one on C7. The position of each marker was acquired by ELITE 2000 system (100 Hz). *Measurements*: sway path (SP), average speed of center of pressure on sagittal (v_{AP}) and on frontal plan (v_{ML}), average ($C7_{RMS}$) and maximum ($C7_{MAX}$) shifting of C7 marker, sway of I met marker (SwayIMet) and number of failures (N_{INS}) in one-leg stance trials. In accordance with [1] all the results have been normalized to the subject's height. The dependence of the measured variables on the level of physical activity was studied trough a (one-way) ANOVA, with the belonging-group (sportsmen, sedentary subjects) taken as factor.

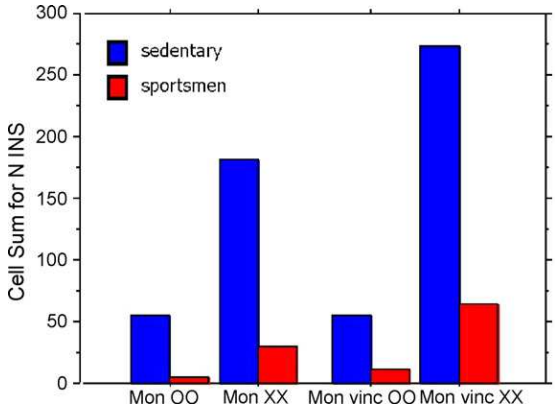

Fig. 1. Total number of failures for the two groups in the different trials.

3. Results

The total number of failures in one-leg stance trials is showed in Fig. 1. The results of the ANOVA are resumed in Table 1.

4. Discussion

The number of failures (foot touching the ground) put in evidence the difference between the two groups as regard the ability of managing with the one-leg stance. The differences found in the one-leg stance are minimum as regard the absolute value, and they don't seem to have any practical application. In one-leg stance with open eyes the difference between the two groups can be seen as regard CoP parameters and in the settlements of the foot (SwayIMet), as to indicate a bigger unsteadiness in sedentary subjects which has to be managed with foot. With closed eyes, trunk swinging comes out, more in the sedentary group. The trials with joint knees and hands behind the back, in which the movements of upper

Table 1
p-values obtained trough (one-way) ANOVA as regards each variable (lines) in the different trials (columns)

	BIP OO	BIP XX	MON OO	MON XX	MON VINC OO	MON VINC XX
SP	n.s.	n.s.	<0.01	0.06	n.s.	0.07
v_{AP}	n.s.	n.s.	<0.01	0.06	n.s.	0.015
V_{ML}	0.06	n.s.	0.02	n.s.	n.s.	n.s.
$C7_{RMS}$ AP	<0.01	n.s.	n.s.	n.s.	n.s.	<0.01
$C7_{RMS}$ ML	<0.01	n.s.	n.s.	0.02	0.06	0.06
$C7_{MAX}$ AP	<0.01	n.s.	n.s.	0.02	n.s.	n.s.
$C7_{MAX}$ ML	0.02	n.s.	0.08	0.02	0.06	n.s.
SwayIMet	–	–	<0.01	<0.01	0.07	0.015

n.s. not significant.