ISB 2013 BRAZIL
XXIV CONGRESS OF THE INTERNATIONAL SOCIETY OF BIOMECHANICS
XV BRAZILIAN CONGRESS OF BIOMECHANICS

ON THE POSTURAL STABILITY OF BALLET DANCERS AND YOGA PRACTITIONERS: A PILOT STUDY

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SUMMARY

Introduction: The postural control system has several components often recruited in static and dynamic activities performed by dancers and yoga practitioners. Dancers are known to be experts on equilibrium tasks [1], but we argue whether yoga practitioners would not exhibit the same ability. **Objective:** The aim of this pilot study is to evaluate the effects of long-term trainings in yoga and ballet on postural stability of experienced subjects. **Methods:** Stability levels were evaluated with a force platform in order to measure three biomechanical variables related to the center of pressure: oscillation area and mean velocities in anterior-posterior and medial-lateral directions. Two yoga teachers and two experienced ballet dancers (average age: 30.5 ± 5.6 years, average height: 1.65±8.5 m, average body mass: 58.9±7.1 kg) with more than five years of practice volunteered to this pilot-study. They performed three trials of 60 seconds of unipodal and bipodal standing still on a force platform in two conditions: eyes opened and closed. **Results:** Yoga practitioners presented significant smaller averages for COP oscillation areas and anterior-posterior mean COP velocities in the bipodal closed eyes and unipodal closed eyes conditions when compared to the dancers. Since these results seem very interesting, a large number of subjects will be further evaluated in order to continue the investigation of this question. **Conclusion:** Our preliminary results suggest that yoga practitioners perform at least as well as dancers in balance tasks and also may be less dependent on visual cues than dancers to control stability levels of the body.

INTRODUCTION

The postural control system is complex and it is in great demand in static and dynamic activities performed by ballet dancers and yoga practitioners. Ballet dancers develop balance by training specific one leg poses and movements, which are executed to its maximum amplitude, requiring a high level of flexibility and strength. In order to achieve the high performance required in choreographies, ballet dancers often practice in front of mirrors, creating a vision dependency strategy to stabilize balance [1].

On the other hand, yoga practice is more introspective and develops balance combining physical postures (asanas), relaxation, breath control (pranayama) and meditation (dhyana) [2], without the help of any external cues in other to achieve total control of mind over body.

Dancers are known to be experts on equilibrium tasks [3], but we argue whether yoga practitioners would not exhibit the same ability and also would be less dependent on vision to control body stability.

Thus, the aim of this pilot study is to evaluate the effects of long-term trainings in yoga and ballet on postural stability of experienced subjects.

METHODS

Two experienced yoga teachers and two experienced ballet dancers (average age: 30.5 ± 5.6 years, average height: 1.65±8.5 m, average body mass: 58.9±7.1 kg) with more than 5 years of practice participated on this pilot study. They performed three trials of 60 seconds of unipodal and bipodal standing still on a force platform in two conditions: eyes opened and closed.

Three biomechanical variables were evaluated using a force platform: the oscillation area of the center of pressure (COP) and the mean velocities of the COP in anterior-posterior and medial-lateral directions. After removing the mean, the root mean squares of anterior-posterior and mediolateral trajectories were calculated to quantify COP oscillations, COP velocities were calculated by differentiation of COP displacements over time in both directions [4].

The subjects performed three 60 seconds trials on the force platform (Bertec, USA) in the bipodal (tf) and unipodal (of) standing position with eyes opened (oe) and closed (ce). The data were sampled at 100 Hz and filtered by a second order, zero-lag, low pass Butterworth filter at 12.5 Hz.

RESULTS AND DISCUSSION

Yoga practitioners showed significant lower means than ballet dancers for COP oscillation areas in the unipodal closed eyes, bipodal opened and closed eyes conditions

(Table 1). The same results were found for the mean velocities in the anterior-posterior direction. No differences were found for the velocities in the mediolateral direction.
The postural control requires continuous feedback from visual, vestibular and somatosensory systems. Both trainings required by the two modalities investigated probably allow enhanced balance stabilization and a better position sense for lower limbs during balance challenging tasks like unipodal standing with eyes closed. For these reasons yoga has also been described as an important aid in improving postural control in elderly [5, 6].

These preliminary results suggest that yoga practitioners appear to be less dependent on the visual system to maintain balance, probably due to the specificities of yoga practice that develops the balance from internal information and breathing control.

After these results, this study will be further developed in order to achieve statistically significant differences between the groups and to validate and generalize the findings.

CONCLUSIONS

Our preliminary results suggest that ballet dancers have a greater dependence on visual feedback for postural stability than yoga practitioners.

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Table 1: Mean and standard deviations of COP oscillation areas and velocities in the anterior-posterior and mediolateral directions for two yoga practitioners and two ballet dancers. *p<0.05

Areas of COP oscillation (cm^2)						
	Bipodal			**Unipodal**		
	yoga	Ballet	p-valor	Yoga	Ballet	p-valor
Opened eyes	0.15 (±0.04)	0.18(±0.06)	0.03*	2.09(±0.15)	2.04(±0.11)	0.05*
Closed eyes	0.15 (±0.03)	0.16(±0.01)	0.03*	1.81(±0.23)	7.23(±0.50)	0.04*
COP mean velocities in the anterior-posterior direction (cm/s)						
	Yoga	Ballet	p-valor	Yoga	Ballet	p-valor
Opened eyes	0.41(±0.01)	0.58(±0.21)	0.00*	0.14(±0..39)	0.54(±0.06)	0.00*
Closed eyes	0.45(±0.05)	0.53(±0.13)	0.00*	0.37(±0.44)	0.72(±0.14)	0.00*
COP mean velocities in the medial-lateral direction (cm/s)						
	Yoga	Ballet	p-valor	Yoga	Ballet	p-valor
Opened eyes	0.32(±0.02)	0.54(±0.03)	0.06	1.63(±0.20)	2.70(±0.18)	0.99
Closed eyes	0.40(±0.03)	0.63(±0.05)	0.08	2.85(±0.30)	5.56(±0.20)	0.66