

Posturographic Assessment in Yoga Practitioners and Non-Practitioners: Balance Benefits

Alexandra Fonseca¹, David Tomé², Fernanda Gentil^{2,3}

¹ GAES – Gabinete de Audioprotésises, Electromedicina e Serviços Lda, Porto, Portugal

² Department of Audiology, School of Allied Health Technologies, Polytechnic Institute of Oporto, Porto, Portugal

³ Clínica ORL Dr Eurico de Almeida, Porto, Portugal

Introduction: Balance is a complex process resulting from the interaction between the following systems: sensorial (input), central nervous system (coordinator), and motor (output). The aging of the vestibular system, central nervous system, and the rest of the body systems may contribute to balance dysfunction. Balance dysfunction is the main symptom in the population aged over 70 years (47% men and 66% women). Treatment can be pharmacologic, chirurgic, or balance rehabilitation. Additionally, there are some balance improvement exercises like pilates, shiatsu, tai chi, and yoga. Yoga is an old discipline originating from India. According to *Baptista & Dantas* 2002, each physical posture adopted in yoga practice generates organic, physical, emotional, and energetic effects, improving physical balance. Recently, yoga was classified as a way of complementary and alternative medicine by *The National Center for Complementary and Alternative Medicine, USA*.

Objective: The aim of this project was to investigate the relationship between balance and yoga through computerized dynamic posturography (CDP). Further, what was the relation between sensory inputs (vestibular, visual, and proprioceptive) and yoga practicing time.

Methods: For this study were selected 50 participants aged between 50 and 80 years: 25 yoga practitioners (experimental group, EG) and 25 non-practitioners (control group, CG) according to exclusion and inclusion criteria. The exclusion criteria for both groups was health-based: no motor, neurologic, visual, or vestibular problems, no hearing loss, and no medication affecting the central nervous system. The inclusion criteria was the practising of at least 2 hours of yoga per week. The evaluation of balance was performed with a computerized dynamic posturography NeuroCom System Version 8.0.1, which included the modified Test of Sensory Interaction and Balance (mCTSIB) and limits of stability test (LOS). The mCTSIB is a simplified variation of the sensorial organization test (SOT) that analyses the patient's functional balance control to quantify postural sway velocity during four sensory conditions. The LOS quantifies the maximum distance a person can intentionally displace their center of gravity (COG) in 8 positions. The measured parameters were: reaction time (RT), COG movement velocity (MV), directional control (DC); end-point excursion (EPE), and maximum point excursion (MPE).

Results/Conclusions: The statistical analysis revealed significant differences between groups for most variables – RT, MV, EPE, and MPE for anterior movements ($p < 0.05$). Proprioception was the most significantly input for balance in CG, but in EG it was the vestibular input; in both groups vision contributed the least to balance. The increase of yoga practicing time gave an RT decrease and a MV increase. These results suggest that yoga practice gives an improvement in the maintenance of orthostatic balance. Yoga could be used as a prevention for balance disorders in the elderly.

generates organic, physical, emotional, and energetic effects, improving physical balance. Recently, yoga was classified as a way of complementary and alternative medicine by *The National Center for Complementary and Alternative Medicine, USA*.

Objective: The aim of this project was to investigate the relationship between balance and yoga through computerized dynamic posturography (CDP). Further, what was the relation between sensory inputs (vestibular, visual, and proprioceptive) and yoga practicing time.

Methods: For this study were selected 50 participants aged between 50 and 80 years: 25 yoga practitioners (experimental group, EG) and 25 non-practitioners (control group, CG) according to exclusion and inclusion criteria. The exclusion criteria for both groups was health-based: no motor, neurologic, visual, or vestibular problems, no hearing loss, and no medication affecting the central nervous system. The inclusion criteria was the practicing of at least 2 hours of yoga per week. The evaluation of balance was performed with a computerized dynamic posturography NeuroCom System Version 8.0.1, which included the modified Test of Sensory Interaction and Balance (mCTSIB) and limits of stability test (LOS). The mCTSIB is a simplified variation of the sensorial organization test (SOT) that analyses the patient's functional balance control to quantify postural sway velocity during four sensory conditions. The LOS quantifies the maximum distance a person can intentionally displace their center of gravity (COG) in 8 positions. The measured parameters were: reaction time (RT), COG movement velocity (MV), directional control (DC); end-point excursion (EPE), and maximum point excursion (MPE).

Results/Conclusions: The statistical analysis revealed significant differences between groups for most variables – RT, MV, EPE, and MPE for anterior movements ($p < 0.05$). Proprioception was the most significantly input for balance in CG, but in EG it was the vestibular input; in both groups vision contributed the least to balance. The increase of yoga practicing time gave an RT decrease and a MV increase. These results suggest that yoga practice gives an improvement in the maintenance of orthostatic balance. Yoga could be used as a prevention for balance disorders in the elderly.

Subjective Patient Benefits from Hearing Aid Technology Developments in the Last 20 Years

A. San Millan, A. Reyes, J. García-Valdecasas

SAERA (School of Advanced Education Research and Accreditation), Spain

Introduction: Self-assessment questionnaires are now considered an important tool in the evaluating listening skills and in gauging how well patients adapt to hearing aids. The APHAB questionnaire is an essential tool that assesses the difficulty in communication or noise in everyday situations and has been used in studies of hearing aids, bone anchored implants, middle ear performance, and electroacoustic stimulation.

Objectives: 1) Determine normative values of the APHAB for the current population. 2) Assess changes in the patient's subjective benefit of wearing hearing aids, considering the technological advances of the past 20 years.

Methodology: A cross-sectional study was performed on 35 patients over 60 years old, binaurally adapted with digital hearing aids and with a minimum experience of hearing aid use of 6 months and a maximum of 18 months. Patient selection was independent of whether the prosthetic adaptation had been better or worse and also of the type of hearing aid (CIC, IC, ITE, RITE, RIC, BTE). Data was collected between January and June 2015. The APHAB results were compared with previously published studies (1995–2010).

Results: Our results show an overall improvement in subjective benefit in each of the subscales, FC (47%), RF (16%), and RV (20%). Regarding noise aversion AV, patients experience less discomfort (8%) than obtained on previous studies. However, the difficulties of communication under environments with background noise and reverberation remain stable. Patients experience difficulties at a rate of 40%.

Conclusions: The benefits, gauged by hearing aid users on the various APHAB sub-scales, have improved in the last 20 years. Communication difficulty in favorable conditions, and in the presence of background noise, situations with reverb, and discomfort caused by noise environments, are lower than those reported previously. Advances in technology provide more comfort and convenience to hearing aid users. On the other hand, hearing aid users still have difficulties, so it is important to continue looking for new ways to improve the benefits in noisy and reverb environments.