7th EFSMA - European Sports Medicine Congress
3rd Central European Congress of Physical Medicine and Rehabilitation
Annual Assembly of the German and the Austrian Society of Physical Medicine and Rehabilitation
Salzburg, 26th - 29th October 2011

7th EFSMA – European Congress of Sports Medicine

3rd Central European Congress of Physical Medicine and Rehabilitation

Annual Assembly of the German and the Austrian Society of Physical Medicine and Rehabilitation

Austrian Society of Physical Medicine and Rehabilitation

Salzburg, Austria
26th–29th October 2011

Book of Abstracts

Organizer: ÖGPMR – Österreichische Gesellschaft für Physikalische Medizin und Rehabilitation
President: Prof. Anton Wicker
Layout: Editorial Office German Medical Science
The abstracts are published online on the German Medical Science website
http://www.egms.de/en/meetings/esm2011/

209

Postural balance in elderly evaluated in a force platform: the vestibular system and its importance in the aging process

André Novo[1], Eugénia Mendes[1], Leonel Preto[1], Miguel Monteiro[2], Ana Azevedo[1], João Correia[1], José de Paz[3]

[1]Polytechnic Institute of Bragança – School of Health, Bragança, Portugal
[2]Polytechnic Institute of Bragança – School of Education, Bragança, Portugal
[3]University of León, León, Spain

Objective: Balance dysfunction remains a significant factor for disability in the elderly [1]. Several mechanisms have been proposed do explain the changes in balance during aging. Balance disorders represent a growing public health problem due to the association with falls and fall related injuries [2]. The complexity of the balance system, however, often requires a thorough, multidisciplinary approach to the evaluation and successful treatment of balance impairment [3]. The vestibular system detects head movement in space and in turn generates reflexes that are crucial for daily activities, such as stabilizing the visual axis and maintaining head and body posture [4]. To measure postural balance an accurate and reliable instrument is needed that can numerically reflect the importance of the different variables involved in human balance [5]. With this study it's our aim to directly determine the balance of older people and to establish the importance of the vestibular system in aging.

Material/Methods: The data of postural balance in three test conditions was collated with a Metitur® force platform (normal standing with eyes open, normal standing with eyes closed, foam standing with eyes open and foam standing with eyes closed, with 30 seconds duration each). Height was measured with a Seca® stadiometer: subjects were asked to stand with back, buttocks and heels against the stadiometer. Subject's feet were together and flat on the floor and their heads in the Frankfort plane.

Results: We evaluated 49 elderly (42 woman and 7 men) with a mean age of 68,73±9,39 years and with a BMI of 28,63±4,77. The postural balance data obtained was:

Mean x-axis speed in normal standing with eyes open – 3,56±1,39 mm/s

Mean y-axis speed in normal standing with eyes open – 6,82±2,5 mm/s

Mean x-axis speed in normal standing with eyes closed – 4,51±2,35 mm/s

Mean y-axis speed in normal standing with eyes closed – 10,96±4,75 mm/s

Mean x-axis speed in foam standing with eyes open – 4,37±1,67 mm/s

Mean y-axis speed in foam standing with eyes open – 9,29±2,86

Mean x-axis speed in foam standing with eyes closed – 5,59±2,62

Mean y speed in foam standing with eyes closed – 15,01±4,29

Establishing correlations, we observed that the age is positively correlated to different types of evaluations in foam: mean x-axis speed in foam standing with eyes open (0,358*; p=0,011), mean y-axis speed in foam standing with eyes open (0,419**, p=0,002), mean x-axis speed in foam standing with eyes closed (0,331*, p=0,02) and mean y-axis speed in foam standing with eyes closed. Comparing the subjects studied with reference values of same age and sex [5], we can observe that our subjects achieve better results (less velocity) in both "x" and "y" axis (subjects versus references values):

Mean x-axis speed in normal standing with eyes open – 3,56±1,39 mm/s vs. 4,18±081 mm/s

Mean y-axis speed in normal standing with eyes open – 6,82±2,5 mm/s vs. 7,27±1,84 mm/s

Mean x-axis speed in normal standing with eyes closed – 4,51±2,35 mm/s vs. 5,68±1,44 mm/s

Mean y-axis speed in normal standing with eyes closed – 10,96±4,75 mm/s vs. 12,20±3,01 mm/s

Taking into account the results in the different tests, the platform software assigns a classification to the importance of the different systems involved in balance. The vestibular system is itself responsible for 55,19% of the total balance of the studied subjects.

Conclusion: The subjects of our sample had better results when compared with reference values of some age and sex. They also tended to have more pronounced sway with age in foam standing with eyes open and in foam standing with eyes closed, in both "x" and "y" axis, which means that the vestibular system has a very important role in the balance of the elderly subjects we have studied.

References

1. Melzer I, Benjuya N, Kaplanski J. Postural stability in the elderly: a comparison between fallers and non-fallers. Age Ageing. 2004;33(6):602-7.
2. Kalisch T, Kattenstroth JC, Noth S, Tegenthoff M, Dinse HR. Rapid assessment of age-related differences in standing balance. J Aging Res. 2011;2011:160490.
3. Matsumura BA, Ambrose AF. Balance in the elderly. Clin Geriatr Med. 2006;22(2):395-412.
4. Sturnieks DL, St George R, Lord SR. Balance disorders in the elderly. Neurophysiol Clin. 2008;38(6):467-78.
5. Era P, Sainio P, Koskinen S, Haavisto P, Vaara M, Aromaa A. Postural balance in a random sample of 7,979 subjects aged 30 years and over. Gerontology. 2006;52(4):204-13.

Please cite as: Novo A, Mendes E, Preto L, Monteiro M, Azevedo A, Correia J, de Paz J. Postural balance in elderly evaluated in a force platform: the vestibular system and its importance in the aging process. In: 7th EFSMA – European Congress of Sports Medicine, 3rd Central European Congress of Physical Medicine and Rehabilitation. Salzburg, 26.-29.10.2011. Düsseldorf: German Medical Science GMS Publishing House; 2011. Doc11esm209.
DOI: 10.3205/11esm209, URN: urn:nbn:de:0183-11esm2099
Freely available from: http://www.egms.de/en/meetings/esm2011/11esm209.shtml