

## ORIGINAL ARTICLE

# Intersession Reliability of Posturographic Measurements and Impact of Somatometric characteristics on Balance Control in Aging

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## ABSTRACT

**Aim:** Muscle quality is very important for the static and dynamic standing balance as well as for walking process. Muscle quality decreases with aging. The main aim of this study was to assess the relationship between somatometric characteristics (such as muscle quality of lower limbs) and balance control and the maintainance of postural stability. Secondly, we focused on the intersession reliability of repeated posturographic measurements.

**Methods:** Twenty-nine adults (age range 60-76, mean age 66,32 years) volunteered for this study. All subjects were tested twice in six types of quiet stance in order to assess the intersession reliability. A set of somatometric characteristics were recorded for the total of study participants, including Body Composition. Only 20 volunteers were tested for relationship TBSA and lower limb strength. Bioelectrical impedance served as an indicator for the description of lower limb strength, combined with posturographic measurements on Kistler's platform. Pearson's correlation coefficient was used to assess the intersession reliability.

**Results:** The study subjects demonstrated increased amounts of postural sway in both Medial-Lateral (M/L) and Anterior-Posterior (A/P) directions. Greater values of body sway indicator, in this case Center of Pressure (COP) displacements, combined with somatometric characteristics, show tendencies to fall (in A/P and M/L direction) as well as possible impact of age-related changes in somatometric characteristics on increasing postural sway.

**Conclusions:** Age-related changes in somatometric characteristics are related to age-worsened postural sway while maintaining balance in quiet stance. Intersession reliability confirms, by the spread of correlation coefficient values, the individuality of each person, in each test of quiet stance and is a useful indicator for assessing the Static Balance in aging.

**Keywords:** *Aging, posture, accidental falls, predisposing*

*factors, Somatotype, body composition, Bioelectrical Impedance.*

## INTRODUCTION

Aging is a highly individualized process, since many variables influence the manner we age. Mazono et al deliver this influence to five major areas of importance.<sup>1</sup> Cardiovascular responses to both acute and chronic exercise, strength training, muscle mass and bone density implications, postural stability, flexibility, and prevention of falls as well as the role of exercise on psychological function, and the exercise for the very old and frail. All of these are related to increasing body sway and decreasing control in the elderly. Worsened postural control and increased body sway mean often higher risk of falling. Falling represents strong apprehensions for the elderly persons. Repeated falls lead finally to the loose of self-efficiency<sup>2</sup> and hospitalisation. For many elders this situation remains insupportable because they consequently lose their habitual social environment, which may influence them more than their physical condition, as reported when asked to estimate their quality of life.<sup>3,4,5</sup> Worsened psychological condition aggravates the psychological condition and may also lead to death.<sup>6,7</sup> Reviewing the literature, it seems that elderly fallers demonstrate significantly greater amounts of sway in A/P (antero-posterior) direction as well as increased muscle activity during quiet standing trials.<sup>8</sup> It results also that quiet standing becomes more and more differentiated with aging. The elderly are also known for the fact that they are not willing to change their habits (including for example the nutritional ones).

With aging we may perceive many metabolic changes<sup>6,9</sup> that have an important impact on many processes in aging organism, as muscle quality, sarcopenia, frailty. Muscle quality has been strongly correlated with quiet and dynamic standing, physiology of walking and gait disturbances. Muscle quality decreases with aging as well as with other predisposing contributors (somatosensory, visual and vestibular system) of postural stability (PS). Muscle mass loss may attain the 40% of former measures in the elderly.<sup>6,9</sup> The decline in muscle strength associated with aging carries with it significant consequences

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