The Tetrax Fall Index – Clinical Background

Physiological Factors Related to Falling

Retrospective and prospective studies have shown that an array of physiological factors reliably predict the incidence of falling in elderly populations. These factors are:

a. Vision, especially contrast sensitivity
b. Vestibular function

c. Proprioception, especially somato-sensory information from the lower extremities

d. Tactile sensitivity of the foot

e. Muscle force

f. Use of various medications (especially in high doses)

All these factors are involved in postural control, which is closely related to the risk of falling. This relationship has been proven by extensive research over the last 15 years.

Tetrax Fall Assessment

The Tetrax balance system has joined this array of research, with clinical studies over the last ten years demonstrating that all of the above factors correlate significantly with the Tetrax postural parameters. These factors include:

a. Visual factors
b. Vestibular function

c. Proprioception

d. Tactile sensitivity of the foot

e. Muscle force
The Tetrax balance system evaluates not only postural stability (intimately related to fall risk) but also an array of other parameters of postural control, including differential spectral analysis of postural sway (Fourier transformations), weight distributions, and synchronizations. All of these are related to the above-mentioned parameters which affect falling, as described above.

The Tetrax Fall Index is calculated based on Tetrax parameters (stability, Fourier transformations, and synchronization). The Fall Index has been shown to be related to the risk of fall in recent studies, including a cross-cultural study on healthy elderly women\textsuperscript{21}, two studies on the assessment of risk of fall and physical training effects in elderly women with osteoporosis\textsuperscript{22,23} and the evaluation of the effect of cataract surgery on fall risk.\textsuperscript{11} In the context of these studies it has been shown:

a. The sensitivity and specificity of the Tetrax Fall Index, with Fall Index results measured against reported falls, are 0.76 and 0.6 respectively.

b. The test-retest reliability of the Tetrax Fall Index is $r=0.88$, for repeat measurement 2 weeks after the original measurement. The Fall Index can be used for treatment monitoring. In one study, the mean Fall Index of a group of elderly subjects dropped, after three months of physical training, from 44.3 to 39.9 ($p<0.05$). In another study, the pre-operative fall index of 23 patients with cataracts was 34.2, compared to 16.6 after the patients underwent cataract operations ($p=0.005$).

The clear relationship between the factors measured by Tetrax and falling, and the studies carried out with Tetrax, show that Tetrax measurement can assess falling, and indicate the usefulness of Tetrax measurement in the assessment of fall risk, particularly in elderly individuals.

References


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