Effect of aging in comparison to pathogenic effects on postural control

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Introduction

With the aging of the population in developed countries and the recognition of the danger of falling and other problems stemming from lack of stability, the testing of balance, or postural control, has become an important issue.
The current study investigates the ability of new posturographic parameters to discriminate between the effect of aging and the effect of pathology on postural control.

Objectives

To apply signal-processing methods to formulate new postural parameters, which would help to discriminate between the effect of aging and the effect of age independent pathogenic factors on postural control.

Methods

One hundred and twenty three subjects were measured using the Tetrax device (Sunlight Medical Ltd., Tel Aviv, Israel). Fifty-eight (n=58) of them were healthy subjects and 65 subjects suffering from balance problems (SCK, age 75±12 yr). The healthy group was subdivided to two subgroups of old (OH) (age ≥65, average age= 76±6 years, n=29) and young (YH) (Age<65, average age= 34±13 years n=29) subjects.
Raw data was collected and parameters in the time domain and in the frequency domain were extracted. In addition structural parameters based on the center of pressure (COP) plot were calculated.

Results

Most of the investigated parameters, among them COP area, Weight Distribution index (WDI), Anterior-Posterior sway and Median Frequency showed a significant differentiation between the sick elderly subjects and the age-matched healthy elderly subjects ($p<0.05$).
The results showed that the COP area parameter was significantly increased in the OH group in comparison to the YH group (1.68±0.64, 0.96±0.69 respectively, $p<0.001$).
However, a significantly ($p<0.001$) higher value was found in the SCK group (3.3±2.89). The same trend was observed in the AP sway results (OH: 0.37±0.1, YH: 0.24±0.05, SCK:0.62±0.34).
The parameter WDI differentiated significantly ($p<0.05$) between the clinical and OH group, while differences between the YH and OH were strikingly insignificant. The WDI difference between the OH and the SCK groups was also significant ($p<0.001$).
The important finding was the relatively small discrepancies of scores due to aging within the limits of (1-1.5 SD), in comparison to the discrepancies between the sick subjects and the YH controls (3 SD and more).

Conclusions

The aging process can be shown in posturographic measurement; however, it is less strong than pathologic processes that are manifested strongly in the calculated posturographic parameters.

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