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EVALUATION OF PELVIC FLOOR MUSCLE ACTIVITY DURING RUNNING IN CONTINENT AND INCONTINENT WOMEN: AN EXPLORATORY STUDY

Hypothesis / aims of study

Running is a popular sport and recreation activity with diverse benefits for the individual health. Yet many women reduce their participation in such sports activities because of the embarrassing condition of stress urinary incontinence (SUI) (1). A high prevalence of 41% has been found in female elite athletes (2) with the highest prevalence in sports involving impact activities. Up to now the main focus of research on pelvic floor muscle (PFM) function has been on voluntary and concentric contractions. Nevertheless many activities of daily life that typically elicit SUI such as running require involuntary and fast reflexive PFM contractions.

Data about reflex activity and contraction characteristics of the PFMs during impact loading are still inadequate. High PFM EMG-activation during running in young continent female subjects has been demonstrated in one study (3). The aim of this study was to investigate and compare pelvic floor muscle activity in continent and incontinent women in a wider age band during running at three different speeds and thereby elucidate contraction characteristics of the pelvic floor during impact.

Study design, materials and methods

A cross-sectional, exploratory design was applied and a sample of 50 women between 18 and 60 years was recruited. Screening for inclusion was performed by an urogynaecologist and SUI was diagnosed according to the ICIQ-UIsf questionnaire. Surface electromyographic (EMG) activity from the PFMs during running on a treadmill was recorded with a vaginal probe, bandpass filtered (20-500 Hz) and computed by RMS-algorithm. EMG was measured during 10 seconds at the speeds 7, 11 and 15 km/h. Data from 30 ms before to 150 ms after heel-strike were RMS-parameterised to time intervals of 30 ms. The reference value set as 100% for EMG normalisation was calculated as the mean of the peak values of activity during two maximum voluntary contractions (MVC). The EMG activity onset threshold (ON) was considered as the mean plus two standard deviations of the filtered and rectified EMG during the 30 seconds rest.

Results

Twenty-two incontinent (SUI, mean age 38.7±10.0) and twenty-eight continent (CON, mean age 45.3±9.5) women were included in this study. No statistically significant differences between continent and incontinent subjects could be found for the EMG values for all time intervals. Mean EMG pre-activity and reflex activity increased significantly with speed (Figure 1). Values for running at 7 km/h ranged from 46.2 to 92.0 %MVC, from 55.7 to107.5 %MVC at 11 km/h and from 80.8 to151.8 %MVC at 15 km/h.

ON values were calculated between 37.3 and 40.6 %MVC. Mean EMG activity of the 6 time intervals was significantly superior to PFM onset activation at all speeds. At the highest speed of 15 km/h values in women with SUI exceeded 100 %MVC for all time intervals.

Interpretation of results

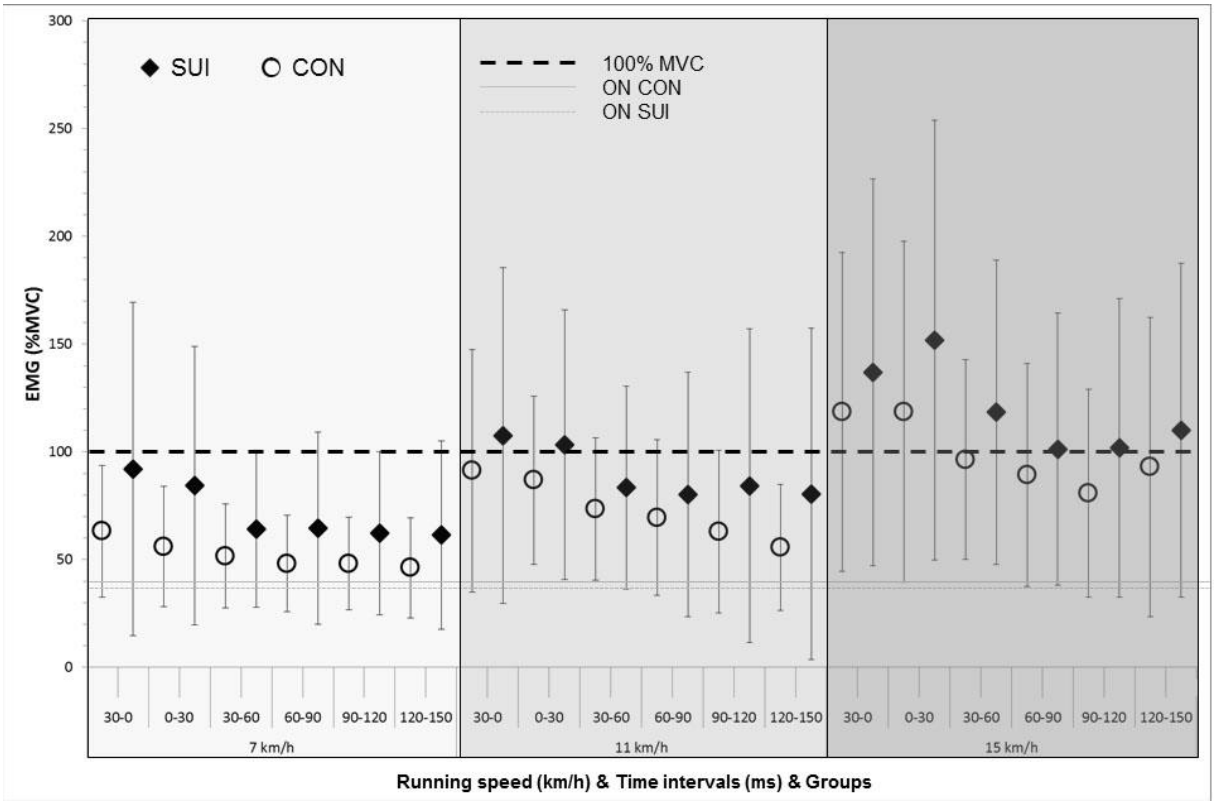
Running appears to trigger pre-activation before and reflex-activation after heel-strike with no statistical differences between the groups. The PFMs where always active during running related to the onset threshold. PFM activity increased with speed which may be explained by rising ground reaction forces and associated higher demand on muscles.

Concluding message

The health benefits of physical activity (which can also include running) are evident. Yet female athletes are inclined to reduce physical activity due to the embarrassing condition of SUI. Maybe women even with SUI should - besides PFM training - be encouraged to continue participation in recreational and regular fitness activities. Running-like stimuli (e.g. a few steps) should therefore not only be regarded with caution due to its contribution to the manifestation of SUI, but also more positively as a potential training stimulus, leading to reflex activity of the PFMs. Running training stimuli may serve as a beneficial complement to a PFM training rationale, leading to reflex activity of the PFMspelvic floor muscles, when used in sense of power training methodology.

Figure **1**

Means and standard deviations of PFM activity during running at three different speeds for continent (CON) and incontinent (SUI) subjects. The horizontal black dashed line at 100% represents EMG activity during MVC in standing. The horizontal grey dashed lines represent EMG onset of activity (ON) for CON and SUI.



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