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EFFECT ON MUSCLES OF MECHANICAL VIBRATIONS PRODUCED BY THE GALILEO 2000 IN COMBINATION WITH PHYSICAL THERAPY IN TREATING FEMALE STRESS URINARY INCONTINENCE

Aims of Study
A prospective randomized study was performed to determine whether intensive vibration training (1-4) using the Galileo 2000 in combination with physical therapy improves the continence rate in women with urodynamically proven stress urinary incontinence. The influence on the pelvic floor muscles and the therapeutic effect on stress incontinence were investigated.

Methods
The Galileo 2000 is a platform with a sagittal axle on which a teeterboard is tilted up and down (5 mm) at a variable frequency of 5 – 30 Hz. This movement produces mechanical oscillations with an average cycle length of about 40 msec, which is the time required to induce a natural monosynaptic stretching reflex in the respective muscle via the muscle spindle during one up and down movement. The neuromuscular system reacts to this stimulation by a chain of rapid muscle contractions which may result in entire-body vibration. Both forms of treatment aim at strengthening the muscles involved in closing the urethra, vibration therapy in a reactive way and physical therapy in an active way.
Twenty-nine patients were examined clinically and urodynamically (including perineal ultrasound and pelvimeter) and assigned to 3 treatment groups. Group A underwent combined physical therapy (PT) and vibration training with the Galileo (Gal) throughout the treatment period. Group B started with physical therapy and switched to vibration training after 12 weeks (PT > Gal), and Group C first had vibration training and then changed to physical therapy (Gal > PT). Weekly training comprised 2 training units with physical therapy of 30 min duration and vibration training of 2 x 4 min. The total length of training was 24 weeks and was followed by a 12-week follow-up period.

Results
The patients' median age at the time of treatment was 50 years (range 34 – 69 years). The objectively determined continence rate was 80% in Group A (combined treatment), 56% in Group B (PT > Gal), and 60% in Group C (Gal > PT). These results were in agreement with the subjective frequency of weekly urine loss. All three groups showed a considerable improvement of mean pelvic floor strength determined pelvimetrically (by 8 µV in Group A, 7 µV in Group B, and 6 µV in Group C). These findings were confirmed by palpation and ultrasound. At the end of the study the average grade of stress urinary incontinence decreased from 1.8 to 0.2 in Group A, from 1.7 to 0.2 in Group B, and from 1.8 to 0.3 in Group C. These results were also reflected by a subjective improvement of complaints in all patients ($p < 0,001$).

Conclusions
Muscle stimulation by vibration training improves the subjective and objective parameters of stress urinary incontinence. The combination of vibration training and physical therapy turned out to be highly effective and thus represents a genuine therapeutic option for patients with stress urinary incontinence.

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