

Effects of Transcutaneous Electrical Pelvic Floor Muscle Stimulation on Peri-Vulva Area on Stress Urinary Incontinence: A Preliminary Study

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Abstract : Stress urinary incontinence (SUI), a common women health problem, is an involuntary leakage of urine while sneezing, coughing, or physical exertion caused by insufficient strength of the pelvic floor and sphincter muscles. SUI also leads to decrease in quality of life and limits sexual activities. SUI is related to the increased bladder neck angle, bladder neck movement, funneling index, urethral width, and decreased urethral length. Various pelvic floor muscle electrical stimulation (ES) interventions have been applied to improve the symptoms of the people with SUI. ES activates afferent fibers of pudendal nerve and smoothly induces contractions of the pelvic floor muscles such as striated periurethral muscles and striated pelvic floor muscles. ES via intravaginal electrodes are the most frequently used types of the pelvic floor muscle ES for the female SUI. However, inserted electrode is uncomfortable and it increases the risks of infection. The purpose of this preliminary study was to determine if the 8-week transcutaneous pelvic floor ES would be effective to improve the symptoms and satisfaction of the females with SUI. Easy-K, specially designed ES equipment for the people with SUI, was used in this study. The oval shape stimulator can be placed on a toilet seat, and the surface has invaded electrode fit to contact with the entire vulva area while users are sitting on the stimulator. Five women with SUI were included in this experiment. Prior to the participation, subjects were instructed about procedures and precautions in using the ES. They have used the stimulator once a day for 20 minutes for each session at home. Outcome data was collected 3 times at the baseline, 4 weeks and 8 weeks after the intervention. Intravaginal sonography was used to measure the bladder neck angle, bladder neck movement, funneling index, thickness of an anterior rhabdosphincter and a posterior rhabdosphincter, urethral length, and urethral width. Leavator ani muscle (LAM) contraction strength was assessed by manual palpation according to the oxford scoring system. In addition, incontinence quality of life (IQOL) and female sexual function index (FSFI) questionnaires were used to obtain addition subjective information. Friedman test, a nonparametric statistical test, was used to determine the effectiveness of the ES. The Wilcoxon test was used for the post-hoc analysis and the significance level was set at .05. The bladder neck angle, funneling index and urethral width were significantly decreased after 8-weeks of intervention ($p < .05$). LAM contraction score, urethral length and anterior and posterior rhabdosphincter thickness were statistically increased by the intervention ($p < .05$). However, no significant change was found in the bladder neck movement. Although total score of the IQOL did not improve, the score of the 'avoidance' subscale of IQOL had significant improved ($p < .05$). FSFI had statistical difference in FSFI total score and 'desire' subscale ($p < .05$). In conclusion, 8-week use of a transcutaneous ES on peri-vulva area improved dynamic mechanical structures of the pelvic floor musculature as well as IQOL and conjugal relationship.

Keywords : electrical stimulation, Pelvic floor muscle, sonography, stress urinary incontinence, women health

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