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A META-ANALYSIS OF PELVIC FLOOR MUSCLE TRAINING FOR TREATMENT OF WOMEN WITH URINARY INCONTINENCE

Hypothesis / aims of study
The first aim of this meta-analysis was to calculate effect size of pelvic floor muscle training (PFMT) compared with no-treatment. The second was to identify the most effective characteristics in some parameters of PFMT and the combination of these parameters in treating female urinary incontinence (UI). The last aim was to identify sample characteristics acting as moderators on the effect of PFMT.

Study design, materials and methods
The search for relevant literature published from 1980 to 2005 consisted of using several computerized databases such as Medline, Cumulative Index for Nursing and Allied Health Literature (CINAHL), and KoreaMed, citation searches of the Social Sciences Citation Index (SSCI) and the Science Citation Index (SCI), and footnote chasing. This analysis focused on 11 studies with the following inclusion criteria: (a) sample limited to women with UI; (b) research design limited to randomized controlled trials; (c) interventions based on the PFMT; (d) control groups limited to no-treatment control groups or placebo PFMT control groups; and (e) enough information to calculate effect size and mean weighted effect size of at least one outcome variable including incontinent episodes, urine leakage amount, and perceived severity of urine loss.
An effect size and 95% confidence interval (CI) for each outcome variable in each study was calculated using Hedges's g and the mean weighted effect sizes were calculated weighing for study variance. Subgroup analyses also were performed to examine whether the results varied by characteristics of PFMT and subjects. To investigate the possibility of publication bias affecting the results, rank correlation test and the analysis of fail-safe N were performed.

Results
The results of analyses for publication bias showed that publication bias was unlikely to be present in this meta-analysis.
In this meta-analysis, a negative effect size meant that the subjects in the intervention groups improved more on the each outcome measure than the subjects of the control groups. The mean weighted effect size on incontinent episodes was -1.42 (95% CI = -2.10 ~ -0.74, Z = 4.80, $p < .000$). The mean weighted effect size on urine leakage amount was -0.88 (95% CI = -1.71 ~ -0.05, Z = 2.07, $p = .038$). The mean weighted effect size on perceived severity was -1.51 (95% CI = -2.61 ~ -0.42, Z = 2.71, $p = .006$).
The subgroup analysis was performed on incontinent episodes only. The mean weighted effect size for the studies with more than eight weeks of PFMT was -3.18 (95% CI = -5.24 ~ -1.12, Z = 3.02, $p = .002$), whereas the mean weighted effect size for studies with eight weeks or less PTFM was -0.57 (95% CI = -0.75 ~ -0.38, Z = 6.01, $p < .000$). No statistically significant differences were detected between the two groups based on length of training ($Q_{BET} = 2.307$, $df = 1$, $p > .10$). Studies with fewer than 45 contractions a day showed a mean weighted effect size of -1.89 (95% CI = -4.52 ~ 0.73, Z = 1.41, $p = .157$), while studies with 45 or more contractions a day showed a mean weighted effect size of -1.81 (95% CI = -2.91 ~ -0.71, Z = 3.23, $p = .001$). Only an intensity of 45 or more contractions a day was effective in reducing incontinent episodes ($Q_{BET} = 6.29$, $df = 1$, $p < .025$). Studies with women with stress incontinence and mixed incontinence with dominant stress symptoms showed a mean weighted effect size of -2.60 (95% CI = -4.23 ~ - 0.97, Z = 3.13, $p = .001$). In studies with subjects who had any type of (or unspecified) incontinence, the mean weighted effect size was -0.47 [95% CI -0.68 ~ -0.26 (Z=4.43, p < .000). The Q_{BET} was 5.91 ($df = 1$, p < .025), indicating that the effectiveness of PFMT was significantly higher for women with stress incontinence and mixed incontinence with dominant stress symptoms. The mean weighted effect size for studies that included subjects with average ages 60 years and over was -0.54 (95% CI = -0.71 ~ -0.37, Z = 6.26, $p < .000$). In studies in which the average age was younger than 60 years, the mean weighted effect was -4.34 (95% CI = -8.37 ~ -0.30, Z = 2.11, $p = .035$). The effectiveness of PFMT on incontinent episodes was significantly higher in the studies with women younger than 60 years on average than in studies with women more over 60 ($Q_{BET} = 13.48$ $df = 1$, $p < .001$).

Interpretation of results
The overall mean weighted effect size of PFMT on incontinent episodes, amount of urine leakage amount, and perceived severity were all large. Thus, PFMT was effective in reducing incontinent episodes, urine leakage amount, and perceived severity compared to no-treatment.
The results of subgroup analyses imply that 45 or more pelvic floor muscle contractions daily are required to reduce incontinent episodes if the other characteristics of contraction are not considered and that PFMT is more effective for women with stress incontinence and younger than for women with other types of urinary incontinence who are age 60 or older.

Concluding message
Although the small number of studies included in this meta-analysis required careful interpretation, several implications for clinical practice and future research are suggested. Prescribing at least 45 contractions daily is recommended. The target population for whom PFMT is most effective are women younger than 60 years with stress UI. However, the results also showed the beneficial effects of PFMT for older women and women with urge UI.

FUNDING: **NONE**
DISCLOSURES: **NONE**