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# The Efficacy of a Treatment Program Focusing on Specific Stabilizing Exercises for Pelvic Girdle Pain After Pregnancy

## A Randomized Controlled Trial

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**Study Design.** A randomized controlled trial with stratified block design.

**Objectives.** To evaluate a treatment program focusing on whether specific stabilizing exercises for patients with pelvic girdle pain after pregnancy reduce pain, improve functional status, and improve quality of life.

**Summary of Background Data.** The evidence of effectiveness of treatment for pelvic girdle pain is weak. Recent research has focused on the importance of activation of muscles for motor control and stability of the lumbopelvic region. To the authors' knowledge, the efficacy of applying these principles for pelvic girdle pain has not previously been evaluated in a randomized controlled trial.

**Methods.** Eighty-one women with pelvic girdle pain were assigned randomly to two treatment groups for 20 weeks. One group received physical therapy with a focus on specific stabilizing exercises. The other group received individualized physical therapy without specific stabilizing exercises. Assessments were administered by a blinded assessor, at baseline, after intervention and 1 year post partum. Main outcome measures were pain, functional status and quality of life.

**Results.** There were no dropouts. After intervention and at 1 year post partum, the specific stabilizing exercise group showed statistically and clinically significant lower pain intensity, lower disability, and higher quality of life compared with the control group. Group difference in median values for evening pain after treatment was 30 mm on the Visual Analog Scale. Disability was reduced by more than 50% for the exercise group; changes were negligible in the control group. Significant differences were also observed for physical tests, in favor of the specific exercise group.

**Conclusion.** An individualized treatment approach with specific stabilizing exercises appears to be more effective than physical therapy without specific stabilizing exercises for women with pelvic girdle pain after pregnancy. Key words: [pelvic girdle pain, postpartum, randomized controlled trial, physical therapy, specific stabilizing exercises, effectiveness] **Spine 2004;29:351–359**

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Pregnancy-related low back pain (LBP) and pelvic girdle pain (PGP) are common in many countries. The prevalence rates vary depending on the criteria used for diagnosing or classifying the pain syndrome. However, several studies have shown that approximately 50% of women experience some kind of lumbopelvic pain during pregnancy.[1–4] Most often the pain disappears within 1 to 3 months after delivery.[5,6] However, a substantial number of the women do not recover after delivery.[7,8] Lumbopelvic pain, especially after delivery, may be a serious problem for the individual, her family, and society. This is reflected by the inability to perform daily activities or to earn a living and by a reduced health-related quality of life.[9–11] Effective management to relieve pain and prevent a chronic condition thus becomes an issue of importance for all concerned with women's health.

A wide range of conservative interventions is offered for the treatment of PGP. However, few clinical trials have evaluated the effectiveness of these treatments. A recent systematic review revealed nine controlled trials of physical therapy for women with pregnancy-related back pain and PGP.[12] Because the trials selected in the review were considered heterogeneous with regard to study design, population, intervention, outcome, and varying methodologic quality, it was not possible to draw definite conclusions about the effectiveness of physical therapy. In only one trial were women with postpartum pelvic pain studied.[13] Clearly, there is a need for more studies of treatments based on well-founded principles in this specific patient population.

Recent research has focused on the importance of activation of muscles for motor control and stability of the lumbopelvic region,[14,15] and a theoretic model of pelvic function has been developed on the basis of anatomic and biomechanical studies.[16] This model introduces the self-locking mechanism of the sacroiliac joints with the principles of form and force closure. Form closure refers to a stable situation with closely fitting joint surfaces that allow the sacroiliac joint to be resistant to shear forces. Force closure refers to the additional compressive force necessary for maintaining stability of the pelvis. In this dynamic process, muscle slings are in connection with ligamentous and fascial structures described to contribute to stability. Furthermore, some evidence for a specific role and a crucial role of the transversely oriented abdominal muscles in providing stability to the lumbopelvic region exists.[17–19] Recently, clinical approaches to

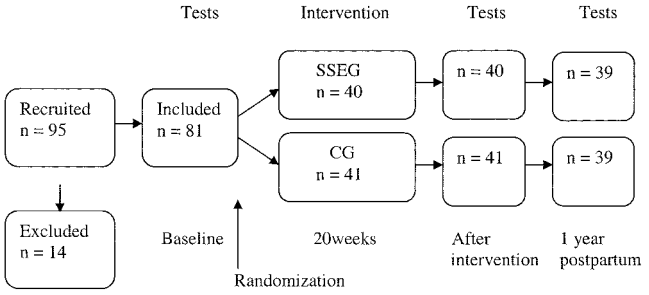


Figure 1. Flow diagram summarizing the study design. SSEG, specific stabilizing exercise group; CG, control group,

the management of lumbopelvic pain, based on these principles, have been proposed.[20,21] However, the efficacy of applying these principles to the treatment of women with pregnancy-related PGP has not been evaluated in a randomized controlled trial, to the authors' knowledge.

The aim of the present study was to evaluate whether specific stabilizing exercises in the treatment of patients with PGP after pregnancy reduced the women's pain, improved functional status, and improved health-related quality of life after the treatment period and 1 year after delivery, better than physical therapy without specific stabilizing exercises.

## ■ Materials and Methods

**Study Population.** Ninety-five patients were recruited from health practitioners (physicians, midwifes, nurses), following an advertisement to health professionals that gave information about the study and the requirements for participation (Figure 1). Inclusion criteria were as follows: PGP located distal and/or lateral to the L5–S1 area in the buttocks and/or in the symphysis,[22] pain onset during pregnancy or within 3 weeks after delivery, most recent delivery within 6 to 16 weeks, willingness to participate in either of the two groups with informed consent, and fulfillment of the diagnostic criteria based on the following tests: Posterior Pelvic Pain Provocation (P4) test,[23] Active Straight Leg Raising (ASLR) test,[24] pain provocation of long dorsal sacroiliac ligament,[25] pain provocation of the symphysis by palpation and by modified Trendelenburg test.[26] The results of the P4 test or the ASLR test had to be positive on the right and/or left side, and at least one of the other three test results had to be positive. Exclusion criteria were as follows: back pain indicating radiculopathy, rheumatology, or other serious disease or pathologic condition; or positive results of the straight leg raise test, Slump test, Crams test, or femoralis nerve test.[27] Altogether, 14 participants were excluded and 81 were included. The study was approved by the regional ethics committee.

**Design.** This study was a randomized, single-blind, clinically controlled study with a stratified group design. The randomization procedure took place after the baseline examination was completed and eligibility was determined. An independent person unaware of subject characteristics administered precoded identical containers to assignment of the subjects to the intervention groups. To obtain groups that were as comparable as possible, stratified randomization was used. The stratification factor was pain location based on three pain groups: pure symphysis pubis pain, pain from all three pelvic joints, pain from either or both sacroiliac joint regions. These variables have been reported to be of possible prognostic importance.[5] The patients (n = 81) were randomized in blocks of four to maintain a consistent class size.

Patients were assigned to either the group with specific stabilizing exercises (SSEG) or the control group without specific stabilizing exercises (CG) (Figure 1). It was not considered ethically or practically feasible to use a control group receiving no treatment in this study. The patients were not blinded to the treatment they received, although special emphasis was placed on blinding them from any expectation bias with regard to the efficacy of different treatments. At the time of the study, specific stabilizing exercises were not a commonly known therapy in the area. The patients were informed that the research was being performed to compare two currently common physical therapies, where the relative efficacy had not yet been established. All patients were treated by experienced physical therapists (n = 6) over a period of 20 weeks. The two interventions were carried out by different therapists in separate clinics.

**Interventions.** The treatment was based on clinical findings in each individual in both groups. Each visit lasted for 40 to 60 minutes. The participants were not allowed to undertake any other treatments for their PGP during the intervention period. However, both groups were encouraged to perform ordinary physical activity. In neither group did the patients incur any charges for the treatment.

**Group 1: Physical Therapy with Specific Stabilizing Exercises.** On the basis of individual examination, an individual program was made for each woman.

Attention was paid to body awareness and ergonomic advice in specific, real-life situations (*e.g.*, lifting and carrying a child). When indicated, joint mobilization, massage, relaxation, and stretching were performed. Mobilization was given individually to approximately 70% of the women in one fifth of their treatment sessions. However, the main focus in this group was on exercise and training (Figure 2). The program was based on specific training of the transversely oriented abdominal muscles with coactivation of the lumbar multifidus at the lumbosacral region,[14] training of the gluteus maximus, the latissimus dorsi, the oblique abdominal muscles,[15] the erector spinae, the quadratus lumborum, and the hip adductors and abductors. Initially, the focus was on specific contraction of the transversely oriented abdominal muscles. After approximately 4 weeks, loading was progressively increased throughout the intervention period. The women were required to exercise for 30 to 60 minutes, 3 days a week, for 18 to 20 weeks.[28] Individual guidance by the physical therapist and adjustments of the exercise program were performed once a week or every second week. Individual records registered details such as resistance and number of repetitions. The exercise equipment Terapi Master was used to facilitate the exercise progression for most of the exercises.[29] The participants borrowed the equipment and had it installed at home during the intervention period, allowing the training to be performed mainly at home. Compliance was measured with the aid of a training diary. The

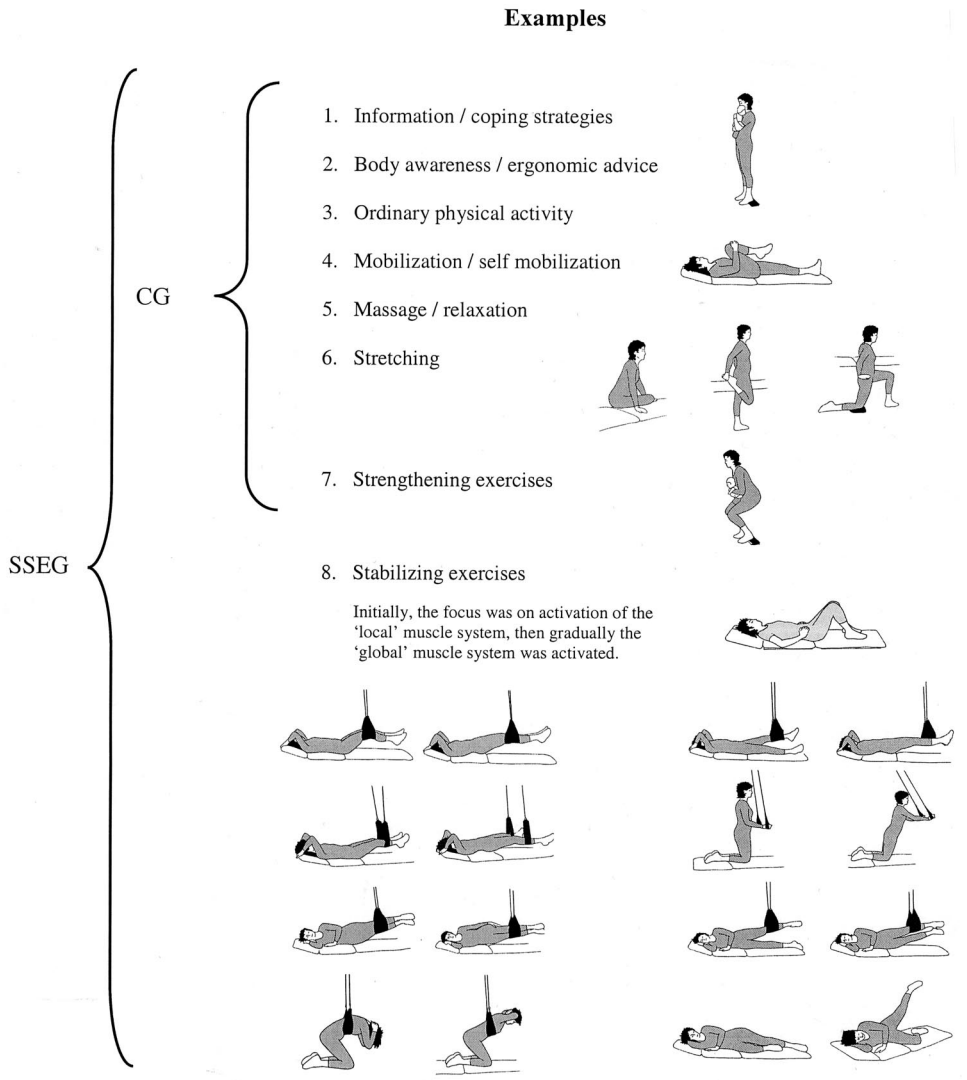


Figure 2. Key elements in the two intervention groups (SSEG 1–8 and CG 1–7).
SSEG, specific stabilizing exercise group; CG, control group.

exercises should not provoke pain, and the subjects were encouraged to activate the transversely oriented abdominal muscles regularly during daily activities.

**Group 2: Physical Therapy Without Specific Stabilizing Exercises.** The patients received different physical therapy methods (ergonomics, massage, joint mobilization, manipulation, electrotherapy, hot packs) as recommended by the physiotherapist on the basis of an individual examination (Figure 2). Mobilizing and strengthening exercises and encouragement to perform daily activities in an ergonomically suitable way were included. However, specific stabilizing exercises were not instructed. The women received treatment approximately every second week, individually adapted over the 20-week period.

**Baseline characteristics.** The patients answered a questionnaire about sociodemographic factors (*e.g.*, age, height, weight, education, parity); various aspects of their history of pelvic pain; LBP before pregnancy; duration of present pain; pain intensity during pregnancy and after childbirth; and other factors such as smoking habits, regular physical activity, and incontinence. The Hopkins Symptom Check List[30] and Health Locus of Control[31] questionnaire were used.

**Outcome Assessments.** At the time of entry, within 1 week after completion of the intervention period, and again 1 year after delivery, assessments as described below were obtained. Questionnaire data 2 years after delivery are in progress and will be published later.

**Questionnaires.** The main outcome measures registered were pain and functional status. Pain intensity varies during the day,[9,13] and the subjects were therefore asked separately about worst pain in the morning and in the evening. Visual Analog Scales (VAS 0–100 mm) were used. Functional status was measured by the Oswestry LBP Disability Questionnaire,[32] revised version by Hudson-Cook.[33] Health-related quality of life was assessed by the SF-36 Health Survey.[34] A booklet with all questionnaires was pilot tested to evaluate its general acceptability with wording and total length. Questionnaires were administered by the assessor and filled in after physical examination.

**Physical Examination.** The hand-held dynamometer Microfet was used for testing strength of adduction and abduction of the hips.[35,36] In addition, the Sörensen Test for endurance of the back muscles was performed[37] (modified version with arms held along the body).[38] The ASLR test, stated to effectively measure disease severity in patients with pregnancy-related PGP,[39] was performed according to the description, and impairment in raising one leg was scored on a 6-point scale from 0 to 5. Scores from both sides were added, so that the summed score ranged from 0 to 10.[24] One independent investigator blind to group allocation performed all tests and assessments. The test procedure was identical each time and was performed at approximately the same time of the day (2 hours deviation was accepted) for each subject.

**Statistical Analysis.** With few exceptions, the variables were assumed continuous, and Student's *t* test was used to determine whether there were group differences at the different times and in changes over time. Pain and ASLR were considered ordinal scales, and Mann-Whitney tests were used. Nominal background variables were compared by Pearson's chi squares. Because there were two measurements after intervention for testing the hypothesis, *P* values below 0.025 were considered to be significant. Effect sizes were calculated by subtracting the baseline scores from the after-treatment scores and 1-year follow-up scores and dividing them by baseline standard deviation.

## ■ Results

### *Study sample*

All patients completed the intervention period and their after-therapy questionnaires (Figure 1). At the follow-up visit (approximately 1 year after delivery, 6 months after end of treatment), 3 participants (3.7%) were pregnant. These 3 subjects were excluded from further analysis, which reduced the total study population at the 1-year follow-up visit to 78 individuals (39 in each group). In addition, three subjects from the CG did not perform physical examination after therapy, two because of severe disability and one because of a suspected new pregnancy. However, questionnaire data were collected from all 81 subjects.

There were no significant differences between the two groups regarding baseline characteristics (Table 1). None of the possible predictive factors (*e.g.,* education, parity, weeks since most recent delivery, duration of present pain, pain intensity during pregnancy, smoking, incontinence, and LBP before pregnancy) were statistically significantly different.

The average number of treatments by physical therapists was 11 in both groups (95 CI 10.3 to 11.6 and 10.0 to 12.6 for the SSEG and the CG, respectively). The participants in the SSEG reported accomplishing, on average, 80% of their exercise program three times a week, performed either at the clinic or at home.

### *Outcome*

There were no significant differences in any of the outcome measures between the groups on entry to the trial.

**Table 1. Baseline Characteristics of Subjects with Regard to Background Variables (Mean Values ± SD)**

| | SSEG (n = 40) | CG (n = 41) | *P* Value |
|---|---|---|---|
| Age (yr) | 32.4 ± 4.0 | 32.3 ± 3.8 | 0.90 |
| Weight (kg) | 69.4 ± 10.7 | 66.6 ± 10.2 | 0.22 |
| Height (cm) | 169.0 ± 5.4 | 16.4 ± 5.9 | 0.19 |
| Education (years at school) | 16.4 ± 2.7 | 15.7 ± 2.2 | 0.24 |
| Parity | 1.8 ± 0.8 | 1.6 ± 0.7 | 0.35 |
| Weeks since last delivery | 10.4 ± 3.1 | 9.2 ± 3.4 | 0.13 |
| Duration of present pain (mo) | 7.3 ± 2.5 | 8.0 ± 5.2 | 0.44 |
| Pain intensity in pregnancy | 5.4 ± 1.4 | 5.2 ± 1.5 | 0.52 |
| Health locus of control score | 19.0 ± 10.7 | 20.1 ± 9.4 | 0.61 |
| Hopkins symptom check list | 1.5 ± 0.3 | 1.5 ± 0.2 | 0.32 |
| Smoking (n, %) | 3 (8) | 3 (7) | 0.98 |
| Incontinence (n, %) | 14 (35) | 17 (42) | 0.55 |
| LBP before pregnancy (n, %) | 18 (45) | 21 (51) | 0.58 |
| Regular physical activity/exercises (n, %) | 27 (68) | 31 (76) | 0.42 |

SSEG, specific stabilizing exercise group; CG, control group; LBP, low back pain.

After intervention and at follow-up there was a statistically significant difference between the two groups in favor of the SSEG (Figure 3 and Table 2). In the SSEG, the highest scores in terms of effect sizes occurred for the Oswestry Disability Questionnaire, evening pain, and the SF-36 subscales of physical functioning, role physical, and bodily pain (Table 3). The changes occurred primarily during the intervention period, with only minor changes thereafter (Figure 3).

Concerning functional status (Figure 3), 75% of the subjects in the SSEG scored lower than 25 on the Oswestry Disability Questionnaire after treatment, whereas only 25% in the CG scored lower ($P < 0.001$). This large difference was maintained or was even larger 1 year post partum. For morning and evening pain, the same trend was seen, with large and significant differences between the groups after intervention and 1 year post partum ($P < 0.001$) (Figure 3). For instance, the group difference in median values for evening pain after treatment was 30 mm on the VAS. Health-related quality of life was significantly higher in the SSEG than in the CG, both after the end of treatment and at the 1 year follow-up visit, except on the scales of emotional role after therapy, and vitality and mental health after 1 year (Table 2). The differences in scores between the groups were especially large for physical functioning, physical role, and bodily pain ($P < 0.001$). The results of the physical tests showed statistically significant differences between the groups in change score during the intervention period, in favor of the SSEG (Figure 4).

## ■ Discussion

The main finding of this study was that a treatment program containing specific stabilizing exercises was considerably more effective in reducing pain, improving functional status, and improving health-related quality of life, compared with an intervention without specific sta-

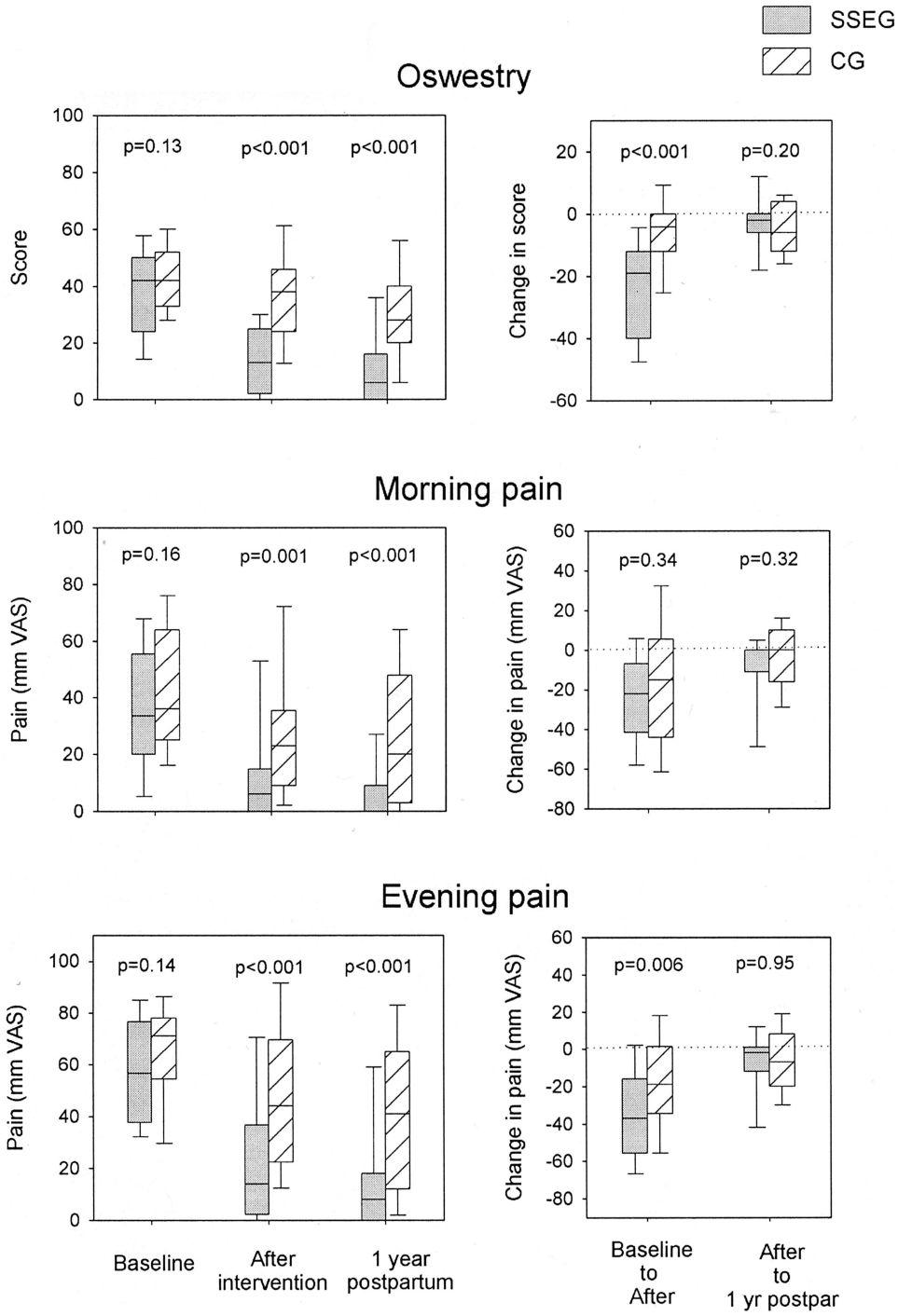


Figure 3. Scores of functional status (Oswestry Disability Questionnaire) and worst pain (0–100 mm Visual Analog Scale [VAS]) at baseline and after therapy (SSEG n = 40, CG n = 41) and 1 year post partum (SSEG n = 39, CG n = 39). The changes in scores from baseline to after therapy and after therapy to 1 year after are shown to the right. Data are given as median (middle line), 10% and 90% quartiles. SSEG, specific stabilizing exercise group; CG, control group.

bilizing exercises. These results are in contrast with one previous study, wherein the effect of a program aimed at improving stability of the pelvic girdle by graded exercises of the diagonal trunk muscle system were examined.[13] In contrast to the present study, the previous study showed no beneficial effect of the exercise program compared with placebo exercises and no exercises at all.

The differences in results of these two studies may be explained by methodologic factors or by the interventions studied. In the study by Mens et al,[13] only 44 subjects were included, and 25% of the subjects terminated their exercise program because of increased pain. Hence, sample size and compliance were not optimal, and furthermore the exercises appear to have aggravated their symptoms more than relieving them. In the present study, both groups completed their treatment plan, and compliance was high. The ability to exercise without provoking pain was reported to be important for compliance. Furthermore, the women described the possibility for training at home under guidance of the therapist, as well as a training diary, as important for compliance with the program. They reported being motivated by the ability to gradually increase the resistance of their individually adapted exercises. Also, the integration of mus-

**Table 2. Health-Related Quality of Life Scores, measured by the SF-36 Health Survey (Mean Values ± SD)**

| | Baseline | | | After Intervention | | | 1 Year follow-up | | |
|---|---|---|---|---|---|---|---|---|---|
| SF-36 | SSEG (n = 40) | CG (n = 41) | *P* | SSEG (n = 40) | CG (n = 41) | *P* | SSEG (n = 39) | CG (n = 39) | *P* |
| Physical functioning | 52.8 ± 19 | 46.3 ± 21 | .15 | 83.8 ± 12 | 58.7 ± 22 | <.001 | 86.4 ± 14 | 64.6 ± 19 | <.001 |
| Role physical | 13.8 ± 25 | 13.8 ± 25 | 1.00 | 63.1 ± 38 | 31.7 ± 41 | .001 | 78.2 ± 35 | 37.2 ± 41 | <.001 |
| Bodily pain | 35.8 ± 17 | 32.8 ± 16 | .42 | 65.6 ± 20 | 44.0 ± 21 | <.001 | 71.8 ± 22 | 47.4 ± 23 | <.001 |
| General health | 72.8 ± 17 | 72.5 ± 17 | .93 | 85.1 ± 15 | 74.7 ± 20 | .010 | 82.3 ± 18 | 69.7 ± 22 | .008 |
| Vitality | 44.4 ± 17 | 37.9 ± 18 | .10 | 55.4 ± 19 | 44.6 ± 16 | .008 | 55.1 ± 18 | 45.5 ± 20 | .03 |
| Social functioning | 69.4 ± 18 | 61.0 ± 28 | .11 | 90.0 ± 15 | 73.2 ± 29 | .001 | 89.1 ± 18 | 77.0 ± 28 | .02 |
| Role emotional | 74.2 ± 37 | 80.5 ± 34 | .42 | 89.2 ± 23 | 82.9 ± 36 | .35 | 93.2 ± 17 | 77.8 ± 35 | .02 |
| Mental health | 77.2 ± 13 | 74.5 ± 14 | .37 | 82.8 ± 11 | 75.9 ± 13 | .011 | 80.7 ± 12 | 75.6 ± 15 | .10 |

SSEG, specific stabilizing exercise group; CG, control group.

cle control into functional tasks encouraged compliance and probably reduced potential fear avoidance patterns.

In the present study, the program with stabilizing exercises was designed to involve all relevant muscles for the pelvic girdle. The transversely oriented abdominal muscles are stated to be of particular importance as primary stabilizers of the lumbopelvic area.[40] In contrast to our study, Mens et al[13] did not include exercises for these muscles. As important as high-quality exercises is the way the exercises are performed. In the present study, the stabilizing exercises were thoroughly instructed initially and supervised regularly. This ensured that the subjects performed the intended program. In the study by Mens et al,[13] the study group received a videotape with instruction of exercises to be performed at home without supervision. In the present study, the workload was gradually increased according to improvement, and the program lasted for 20 weeks, compared with 8 weeks in the study by Mens et al.[13] These considerations are in keeping with guidelines from American College of Sports Medicine[28] for increasing muscle strength and endurance, which are considered to be important factors for improvement as well. The present study also focused on integration of exercises into daily activities, a focus not reported in the other study. Comparison of the two studies thus reveals marked differences regarding type of exercises, dosage, duration, and instructions, with corresponding differences in outcome.

**Table 3. Effect Size Scores (ES) After Treatment and After 1 Year**

| Specific Stabilizing Exercises Group | | | Control Group | |
|---|---|---|---|---|
| | After Treatment | After 1 Year | After Treatment | After 1 Year |
| Oswestry DQ* | 1.49 | 1.71 | 0.48 | 0.88 |
| Pain evening | 1.49 | 1.82 | 0.96 | 1.23 |
| Pain morning | 0.98 | 1.29 | 0.72 | 0.81 |
| SF-36** | | | | |
| PF | 1.66 | 1.80 | 0.58 | 0.86 |
| RP | 2.00 | 2.61 | 0.71 | 0.92 |
| BP | 1.75 | 2.12 | 0.68 | 0.89 |
| GH | 0.73 | 0.56 | 0.13 | 0.16 |
| VT | 0.65 | 0.63 | 0.37 | 0.42 |
| SF | 1.16 | 1.09 | 0.44 | 0.58 |
| RE | 0.41 | 0.52 | 0.07 | 0.08 |
| MH | 0.42 | 0.27 | 0.10 | 0.08 |

* Oswestry Disability Questionnaire
** PF = physical functioning, RP = role physical, BP = bodily pain, GH = general health, VT = vitality, SF = social functioning, RE = role emotional, MH = mental health

In the present study, both groups received individualized programs, in which the main systematically different factor between the groups was the specific stabilizing exercises. Two previous studies have examined the effect of exercises for activation of the transversus abdominis and multifidus muscles. O'Sullivan et al[41] found that a specific exercise treatment approach appeared more effective than other commonly prescribed conservative treatment programs in patients with chronically symptomatic spondylolysis or spondylolisthesis. Hides et al[42] found that muscle recovery was more rapid and complete in patients with acute first-episode unilateral LBP who received specific, localized exercises than in those who received medical treatment only. Long-term effects revealed that patients from the specific exercise group experienced fewer recurrences of LBP, 1 and 3 years later, than patients in the control group.[18] Even though these are LBP studies with small sample sizes, it is in line with recent research showing that contraction of the transversus abdominis muscle significantly decreases the laxity of the sacroiliac joints.[43] Asymmetric laxity of the sacroiliac joints is considered a risk factor for chronic pain after delivery.[44] Thus, the increase in sacroiliac joint stability by contraction of transversely oriented abdominal muscles may be of importance for PGP patients.

So far, an ideal set of outcome measures specially designed and validated for PGP does not exist.[45] In this study, the common measures for self-reported pain, function, and health-related quality of life were used. All these measurements show significant differences in favor of the specific exercise group. Also, the physical tests improved most for the SSEG. The ASLR test is stated to be a measure of impaired load transfer through the lumbopelvic region.[24,39,46] In the present study, the specific stabilizing exercises aimed at improving motor control and stability through improving force closure in the pelvis. The close association between changes in pain and

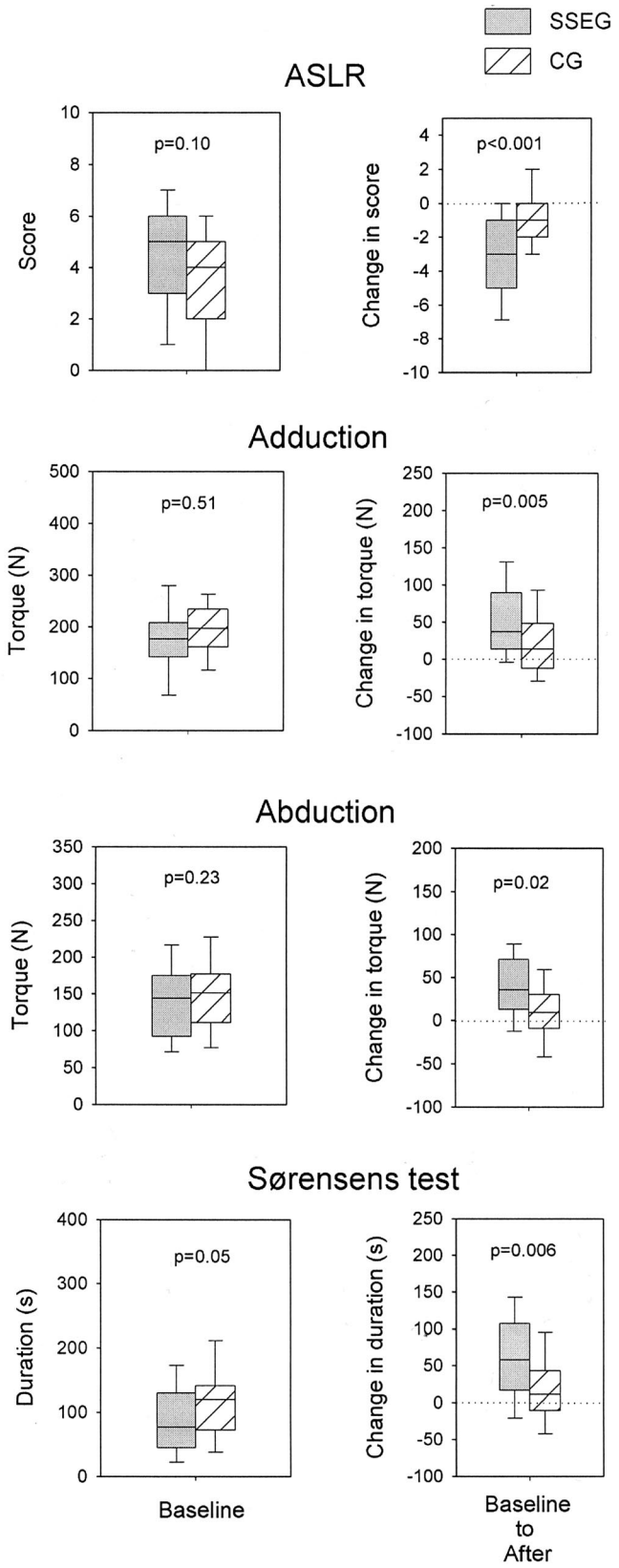


Figure 4. Scores of physical tests (Active Straight Leg Raising Test [ASLR], hip adduction, hip abduction, Sørensen back endurance test) at baseline (SSEG n = 40, CG n = 41) and change in scores from baseline to after therapy are shown to the right (SSEG n = 40, CG n = 38). Data are given as median (middle line), 10% and 90% quartiles. SSEG, specific stabilizing exercise group; CG, control group.

disability and the ASLR test in this study indicate that the intervention in the SSEG succeeded in influencing stability and load transfer.

Return to work was not used as an outcome variable because the women were on maternity leave. Neither was a cost-benefit analysis included in this study. However, the specific exercise program probably had economic benefits because it significantly reduced the women's pain and disability and, it may therefore be presumed, the number of health care contacts and need for help in daily life. The program was carried out without expensive equipment and few treatments, considering the long-term effect observed at the 1-year follow-up visit. However, the program demanded an effort from the women in the exercise group to perform exercises 3 days a week for several weeks. Still, this was a low investment when the possibilities of preventing the condition from becoming chronic are considered.

It is stated that differentiation between LBP and PGP is essential for diagnostic, therapeutic, and prognostic purposes.[22] In this study, strict inclusion criteria were used to include PGP patients. In addition, stratified randomization was used to obtain groups that were as comparable as possible. According to the results, an intervention including specific stabilizing exercises was more effective than general physical therapy. The methodologic quality of the present study signifies that the results may be generalized to PGP populations seen in clinical settings. However, the results show a large variability within both groups. Even with the applied inclusion criteria, heterogeneity among the participants may be presumed. In spite of the individualized approach, it is still possible that the treatment was not well enough individualized.

This study aimed to have an effect on dysfunction of the muscle-tendon-fascia system that controls force closure of the pelvis, such as latissimus dorsi, the gluteus maximus, and the intervening thoracolumbar fascia and the transversely oriented abdominal muscles. However, we do not exactly know how the exercises influenced this system. The chosen exercises aimed to affect both the local and the global stability system, but it is unknown whether one system had a stronger influence on improvement than the other. Nor is it known to what extent the dosage of the exercise program or the joint mobilization as a supplement to exercises affected the results. Further investigation is needed to identify the most effective elements in this type of individual intervention program.

## ■ Conclusion

The results of this study show that a treatment program with specific stabilizing exercises, integrated functionally, is effective in reducing pain, improving functional status, and improving health-related quality of life in women with PGP after pregnancy. Because the methodologic quality is high owing to randomization, control of

co-interventions a blinded outcome assessor, no drop-outs, and high compliance with treatment in both groups, the results provide strong evidence for the effectiveness of a treatment program focusing on stabilizing exercises for this patient group.

### ■ Key Points

- Recent research has focused on the importance of activation of muscles for motor control and stability of the pelvis. However, the effect of applying these principles has not previously been evaluated for women with pregnancy-related pelvic girdle pain.
- This prospective, randomized controlled trial examined the effect of physical therapy with specific stabilizing exercises *versus* physical therapy without specific stabilizing exercises.
- After treatment, the specific exercise group showed clinically and statistically significant lower pain intensity, lower disability, higher quality of life, and better improvements on physical tests, compared with the control group.
- The differences between treatment groups persisted 1 year post partum.

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