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## REVIEW ARTICLE

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# Pelvic Girdle Pain and Low Back Pain in Pregnancy: A Review

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■ **Abstract:** Pregnancy-related pelvic girdle pain (PGP) and pregnancy-related low back pain (PLBP) are common problems with significant physical, psychological, and socioeconomic implications. There are several management options that are underutilized because of lack of comprehensive knowledge by health-care professionals and fear of harmful effects of treatment on the developing fetus. Interventions such as patient education, the use of pelvic belts, acupuncture, and aquatic and tailored postpartum exercises can be of some benefit to these patients. This article will focus on the diagnosis and management of PGP and PLBP, with discussion of terminology, epidemiology, risk factors, pathophysiology, and prognosis. ■

**Key Words:** pelvic girdle pain, pregnancy-related pelvic girdle pain, pregnancy-related low back pain, pregnancy-related lumbopelvic pain, symphysis pubis dysfunction

### INTRODUCTION

It is easy to underestimate the problem of pregnancy-related pelvic girdle pain (PGP) and pregnancy-related low back pain (PLBP). In reality, both conditions are very common, with around 45% of all pregnant women

and 25% of all postpartum women suffering from PGP and/or PLBP.<sup>1</sup> This pain can have an adverse impact on the quality of life (QOL) for women who are affected, and there is some evidence of socioeconomic detriment mainly as a consequence of absenteeism from work.<sup>2,3</sup> Despite these facts, it appears that health-care workers still lack comprehensive knowledge about the available management strategies and fear the possible harmful effects of treatment on the developing fetus. Women are encouraged to believe that these conditions are temporary and self-limiting (which may not always be the case), and their complaints are dismissed as “normal aches and pains of pregnancy.” Anecdotally, there appear to be an increasing number of patients who are requesting induction of labor or even elective cesarean section before the recommended 39th week of gestation in order to achieve symptomatic relief. Such delivery options clearly increase the risk to both mother and baby while also having significant resource implications.<sup>4,5</sup>

Most of the literature does not distinguish between PGP and PLBP. It is possible, although not easy, to distinguish between the two types of pain based on the site and character of the pain, its intensity, and the resultant disability.<sup>6</sup> A number of pain provocation tests have also been described.

This article will focus on the diagnosis and management of PGP and PLBP, with discussion of terminology, epidemiology, risk factors, pathophysiology, and prognosis.

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## LITERATURE SEARCH

The literature search was performed in Medline, PubMed, Google, Embase, Ovid, DAREnet, Cumulative Index to Nursing and Allied Health Literature, and Cochrane library using the search terms listed in Table 1 for the last 30 years. From the review of abstracts, we identified the articles useful for our review. All useful articles in English and their relevant cross-references were collected. The first two authors (E.V. and R.M.) independently studied these articles, decided on their relevance to the review, and summarized the key findings, and any discrepancies were resolved by discussion with the third author (A.W.).

## TERMINOLOGY

There are a number of terms in literature used to describe pelvic girdle pain (Table 1). Symphysis pubis dysfunction is the term that is familiar to many medical professionals, but it has been generally superseded in the literature by pelvic girdle pain because the condition is rarely restricted to the pubic symphysis.<sup>7</sup> Most of the terms in the literature allude to the suspected pathophysiological mechanisms for this pain, which are still not entirely clear. In this article, we have chosen to use the terms coined by Wu et al., which are PGP, PLBP, and lumbopelvic pain.<sup>1</sup> These authors have used the word “pregnancy related” to take into account the fact that complaints can also start after delivery (the use of alternate words such as “in pregnancy” and “after pregnancy” would be unnecessarily limiting).<sup>1</sup> The term “pelvic girdle pain” rather than “pelvic pain” points to pain being of musculoskeletal rather than gynecological origin.<sup>1</sup> Lumbopelvic pain includes PGP, PLBP, and their

combination.<sup>1</sup> There is an explicit need for standardization of terminology for PGP and PLBP in order to improve perception and promote optimal management of these conditions.

In this article, we will use the term PGP to refer to pain in the symphysis pubis and/or pain in the regions of one or both sacroiliac joints (SIJs) and pain in the gluteal region, and we will use the term PLBP for pain in the lumbar region.

## EPIDEMIOLOGY

Although the vast majority of studies on PGP/PLBP has been carried out in Scandinavia, studies have also been carried out in The Netherlands,<sup>8</sup> the U.S.A.,<sup>9</sup> the U.K.,<sup>10</sup> Australia,<sup>11</sup> Africa,<sup>12</sup> Iran,<sup>13</sup> and Israel,<sup>14</sup> indicating that PGP and PLBP are universal problems.<sup>15</sup>

Studies report a wide range of prevalence (4% to 76%) of PGP and/or PLBP.<sup>1,6,14,16,17</sup> This variation is a result of the criteria employed by various studies for the diagnosis of PGP and/or PLBP (patient self-report, doctor’s report, or history and clinical examination as diagnostic criteria), design of the study (prospective or retrospective), sample size, and location of the pain in the back.<sup>1,16</sup>

Wu et al., in their systematic review of 28 studies, found that around 45% of all pregnant women and 25% of all postpartum women suffered from PGP and/or PLBP.<sup>1</sup> Of all those pregnant mothers, 25% had severe pain and 8% had severe disability. Severe pain also featured in 7% of all the postdelivery patients. Overall, PGP was the most common condition, affecting 50% of the symptomatic patients. PLBP affected 33%, while the remaining 17% had features of both the conditions.<sup>1</sup> Vleeming et al., in their systematic review, found a 20% point prevalence of PGP.<sup>16</sup> Most women with PGP recover a few weeks or months after delivery, but 8% to 10% continue to have pain for 1 to 2 years.<sup>18–20</sup>

## RISK FACTORS

There are a large number of diverse factors that have been evaluated for association with PGP and/or PLBP (Table 2). Wu et al., in their analysis of 34 studies, identified strenuous work, previous low back pain, and a previous history of PGP or PLBP as strong predictors for pregnancy-related lumbopelvic pain (PGP + PLBP).<sup>1</sup> They speculated that the above factors result in local tissue damage, which predisposes to subsequent development of the symptoms. Similarly, Bastiaanssen et al., in an analysis of 25 studies, also found that the above

**Table 1. Terminology Used in Literature to Describe PGP and PLBP**

Symphysis pubis dysfunction
Pelvic girdle pain
PGP
PLBP
Lumbopelvic pain
Pelvic girdle relaxation
Pelvic insufficiency
Pelvic arthropathy
Backache during pregnancy
Peripartum pelvic pain
Symptom-giving pelvic girdle relaxation
Pregnancy-related pelvic pain
Posterior pelvic pain after pregnancy
Relaxation of pelvic joints in pregnancy
Pelvic instability
Symphysiolysis

PGP, pregnancy-related pelvic girdle pain; PLBP, pregnancy-related low back pain.

**Table 2. Risk Factors Evaluated in Various Studies for PGP and PLBP**

Physical Factors
Age
Weight
Height
Body mass index
Parity
Oral contraceptives
Smoking
Social conditions
Psychosocial Factors
Stress level
Work satisfaction
Strenuous work
During Pregnancy/Labor
Higher fetal weight
Prolonged second stage of labor
Traumatic delivery
Excessive hip abduction
Others
Previous low back pain
Previous history of PGP or PLBP
Low back pain during menstruation
Trauma to the back

PGP, pregnancy-related pelvic girdle pain; PLBP, pregnancy-related low back pain.

three factors were associated with the development of PGP.<sup>15</sup> Vleeming et al., in their systematic review, identified history of previous low back pain and previous trauma to the pelvis as risk factors for developing PGP.<sup>16</sup>

Factors that do not affect the risk include use of contraceptive pills, time interval since last pregnancy, height, weight, smoking, and age.<sup>16</sup> Furthermore, epidural/spinal anesthetic and analgesic techniques are not associated with the development of this pain.<sup>21</sup>

### PATHOPHYSIOLOGY OF PGP

The underlying mechanisms that lead to the development of PGP remain speculative, although mechanical,<sup>22,23</sup> traumatic,<sup>24</sup> hormonal,<sup>11</sup> metabolic,<sup>25</sup> and degenerative<sup>26</sup> factors have all been proposed.

The pathophysiology is based on conjecture, and the most plausible hypothesis behind the development of PGP is a combination of both hormonal and biomechanical factors.<sup>27</sup> The pelvis is a platform that serves to transmit load from the trunk to the legs. For the load to be effectively transferred and for the shear forces to be minimized across the joints, the pelvis needs to be optimally stabilized. This stabilization, which is primarily needed at the SIJs, is achieved by specific anatomic characteristics (so called “form closure”). These include the ridges and grooves in the articular surfaces of the SIJs. The wedge shape of the sacrum allows it to fit tightly between the ilia, while there are additional com-

pression forces (so called “force closure”), which are generated by the muscles, fascia, and ligaments, that attach to the pelvis and act across the SIJs to give the joints their stability.<sup>28,29</sup>

Relaxin is a polypeptide hormone that is produced in increased quantities by both the corpus luteum and the uterine decidua during pregnancy.<sup>11</sup> By relaxing the connective tissue, it leads to greater ligament laxity, particularly in the joints of the pelvis. This results in the widening and separation of the symphysis pubis, which can be demonstrated radiologically in pregnant women.<sup>22,30</sup> There is also evidence that there is both increased SIJ laxity and greater synovial fluid volume in pregnant women, although these findings come from postmortem studies.<sup>23</sup> A recent systematic review found that patients with PGP have increased motion in their pelvic joints as compared with healthy pregnant controls.<sup>31</sup> This increased motion in the pelvic joints, in pregnant women with PGP, diminishes the efficiency of load transmission and increases the shear forces across the joints.<sup>25</sup> These increased shear forces might be responsible for pain in pregnant women with PGP.<sup>25</sup>

### CLINICAL FEATURES

PGP and PLBP usually start around the 18th week of pregnancy (peak intensity between 24th and 36th weeks), but can also start in the first trimester or be delayed as late as 3 weeks after delivery.<sup>1,32</sup>

#### PLBP

PLBP is characterized by lumbar region pain. It is dull in character and is experienced when the patient is in forward flexion. There is restriction of spine movement in the lumbar region, and palpation of the erector spinae muscles exacerbates pain.<sup>6</sup> The pain resembles the back pain that occurs in the nonpregnant state.<sup>33</sup>

#### PGP

Vleeming et al. have defined PGP as: “In PGP pain is experienced in-between the posterior iliac crest and the gluteal fold, particularly in the vicinity of the sacroiliac joints (SIJ). The pain may radiate into the posterior thigh and can also occur in conjunction with/or separately in the symphysis pubis.”<sup>16</sup> The pain has been described as stabbing, shooting, dull, or burning.<sup>34,35</sup> The average visual analog score for pain is 50 mm to 60 mm on a 100-mm scale.<sup>6,17</sup> The pain is intermittent and can be precipitated by prolonged sustained postures and simple activities of daily living such as walking, sitting, or standing (generally starting within 30 minutes

of an activity).<sup>35</sup> Some patients describe an occasional “catching” sensation in the leg while walking.<sup>36</sup> There is no restriction of movements of the lumbar spine or of the hip joint. Twisting, climbing stairs, unequal weight bearing on legs, and turning in bed can aggravate the symptoms. It is characterized by positive pelvic pain provocation tests.

PGP can become more severe with subsequent pregnancies.<sup>37,38</sup> PGP tends to be more severe than PLBP during pregnancy, while the reverse situation has been observed during postpartum period.<sup>39</sup> PGP has been classified into 5 classes according to the site of pain. These are (1) anterior in the symphysis pubis, (2) posterior in either right or left SIJ, (3) both SIJs, (4) miscellaneous, and (5) complete pelvic girdle syndrome with pain in all three pelvic joints.<sup>40</sup> Patients with pain only in the symphysis pubis appear to have the best prognosis, while those with complete pelvic girdle syndrome have the worst long-term outcome.<sup>19</sup>

#### Disability in Women with PGP/PLBP

Women with PGP and PLBP find difficulty with normal activities, such as getting up from a sitting position, turning over in bed, prolonged sitting, prolonged walking, dressing and undressing, and lifting and carrying small weights.<sup>33,41</sup> Women with combined lumbar and posterior pelvic pain are more disabled, and some may be incapacitated to the extent of using crutches and wheelchairs.<sup>41,42</sup> Women with complete pelvic girdle pain are more likely to use crutches.<sup>41</sup> Sexual difficulties are common. Hansen et al., in their descriptive questionnaire-based study on 227 women with pelvic pain, found that 82% of women had problems during sexual intercourse, and 20% of these women could not participate in sexual intercourse at all, because of disabling pain.<sup>34</sup> Similarly, Mogren, in his questionnaire-based survey on 1,071 immediate postpartum women, found that pregnant women with back pain-related pain scores of 7/10 or more at any time during pregnancy were more likely to have an unsatisfying sexual life during pregnancy as compared with women without such pain.<sup>43</sup> The patients with PGP are more disabled as they have much higher pain scores and are more difficult to treat than patients with PLBP.<sup>6,32</sup>

Our search revealed only one study in which QOL of pregnant women with back pain was assessed using a QOL index.<sup>44</sup> This study, which included 160 women in late pregnancy, found that women with back pain had greater reduction in QOL indices as compared with pregnant women without back pain.<sup>44</sup>

## MAKING THE DIAGNOSIS

### Excluding Serious Pathology

For women presenting with low back pain and/or pelvic pain in pregnancy, a thorough history and physical examination should be carried out. The aim is to exclude other causes of pain (Table 3), to differentiate between PGP and PLBP, to assess disability, and to formulate an individualized management plan. Warning signs such as history of trauma, unexplained weight loss, history of cancer, steroid use, drug abuse, human immunodeficiency virus infection or immunosuppressed state, neurological symptoms/signs, fever, or systemically unwell should be sought as they point toward other serious causes of pain. These “red flags” point toward the presence of underlying conditions that might be inflammatory, infective, traumatic, neoplastic, degenerative, or metabolic.<sup>45</sup> Moreover, pain that does not improve with rest and severe disabling pain warrant a meticulous examination, diagnostic investigations, and specialist referral. Focal inflammatory signs and tenderness of the spine may suggest osteomyelitis, and a step felt on examination of spine may suggest spondylolisthesis (where there is slippage of one vertebral body on the adjacent one). The presence of neurological signs such as bowel, bladder, sensory, motor, or reflex involvement may suggest cauda equina syndrome, lumbar disk lesion, spinal stenosis, or any other compressive lesion around the spinal cord, and require urgent specialist referral. Symptomatic lumbar disk herniation, although uncommon in pregnancy, should always be excluded, although it has been found that magnetic resonance imaging (MRI) finding of lumbar disk herniation in pregnant patients with or without back pain has the same prevalence as in nonpregnant asymptomatic patients.<sup>46,47</sup>

**Table 3. Differential Diagnosis of PGP and PLBP**

Urinary tract infection
Osteomyelitis
Lumbar disk lesion/prolapse
Arthritis of spine/hip
Lumbar stenosis
Cauda equina syndrome
Spondylolisthesis
Pregnancy-associated osteoporosis
Femoral vein thrombosis
Osteitis pubis
Rupture of symphysis pubis
Sciatica
Obstetric complications (preterm labor, abruption, red degeneration of uterine fibroid, round ligament pain, and chorioamnionitis)

PGP, pregnancy-related pelvic girdle pain; PLBP, pregnancy-related low back pain.

### Differentiating between PGP and PLBP

It has been suggested that it is important to distinguish between the two conditions, as the management and prognosis of the two conditions may differ.<sup>6,15</sup> Useful methods of differentiation include the site of pain, its character and severity, provoking factors, resultant disability, and the pain provocation tests.<sup>6</sup> Pain referral maps can also be helpful in differentiating between PGP and PLBP. In a typical drawing of PGP, the pain is concentrated under the posterior superior iliac spine, in the gluteal area, the posterior thigh, and the groin.<sup>27</sup> In contrast, patients with PLBP show the pain to be concentrated in the lumbar region above the sacrum.<sup>27</sup>

### Pain Provocation Tests

A number of pain provocation tests have been described for the diagnosis of PGP. Majority of these tests have high specificity but low sensitivity,<sup>16</sup> indicating that if a test is negative, then the patient is unlikely to have PGP. It is recommended to perform as many tests as possible, taking into account the low sensitivity of the tests.<sup>16</sup> The posterior pelvic pain provocation test, Patrick's test, and the long dorsal sacroiliac ligament test are recommended for the diagnosis of the pain in the region of SIJs.<sup>27</sup> For pubic symphysis pain, direct palpation of the symphysis pubis, modified Trendelenberg's test, and active straight leg raising tests are recommended.<sup>27</sup>

**The Posterior Pelvic Pain Provocation Test.** The patient lies supine and the hip is flexed to 90°. The examiner applies pressure on the flexed knee in the longitudinal axis of the femur while stabilizing the pelvis, with the other hand resting on the opposite anterior superior iliac spine. The test is considered positive if this maneuver produces deep pain in the gluteal region.<sup>48</sup>

**Patrick's or FABER (Flexion, ABduction, External Rotation Test).** With the patient lying supine, the examiner flexes the hip, and abducts and externally rotates one leg to bring the ipsilateral heel to rest on the opposite knee. The patient is asked to relax the limb to allow the weight of the leg to draw the knee toward the floor. The test is considered positive if pain is felt in the ipsilateral SIJ or in the symphysis pubis.<sup>49</sup>

**Active Straight Leg Raise Test.** This test has been shown to be useful for the assessment/diagnosis of PGP in postpartum women. The test is performed with the

patient in a supine position with both legs straight and with feet 20-cm apart. The woman is asked to raise one leg after the other to a height of 20 cm above the examination table without bending the knee. The degree of difficulty in performing this is a quick indicator of the severity of the overall condition and correlates well with more detailed back pain disability scores.<sup>50</sup>

**Long Dorsal Sacroiliac Ligament Test.** The patient lies on her side with slight flexion in both hip and knee joints, and is tested for tenderness on bilateral palpation of the long dorsal sacroiliac ligament, directly under the caudal part of the posterior superior iliac spine. The degree of tenderness is related to the severity of the condition.<sup>51</sup>

**Pain Provocation of the Symphysis Pubis by Modified Trendelenburg's Test.** The patient stands on one leg and flexes both the hip and the knee of the other leg to 90°. If the woman experiences symphyseal pain, then the test is considered positive.<sup>49</sup>

The posterior pelvic pain provocation test and Patrick's or FABER test are carried out in supine position. As eliciting these tests can be very painful for the affected women, these tests should be carried out bearing this in mind and the supine position kept for the briefest possible duration in pregnant women to minimize the effects of supine hypotension syndrome on the mother and the baby.

### Imaging

The diagnosis of PGP and PLBP is largely clinical. Ultrasound has been used to measure the interpubic gap between the two pubic bones at the symphysis pubis, but there is no correlation between the severity of symptoms and the degree of separation.<sup>52</sup> X-ray imaging techniques such as computed tomography scans are not ideal in pregnancy, but MRI is thought to be safe,<sup>53</sup> although long-term follow-up studies are awaited. Therefore, currently, the use of MRI should be reserved for the investigation of back pain in pregnancy where there is a strong suspicion of abnormality such as the presence of neurological signs.

## MANAGEMENT

### Prevention

A number of studies have shown that physical fitness exercises before pregnancy reduce the risk of developing back pain in any subsequent pregnancy.<sup>6,54</sup> This benefi-

cial effect of exercise is similar to that seen in the general population.<sup>55</sup> Also, Mantle et al., in a controlled study on 208 primiparous women, found that back care advice given to pregnant women in early pregnancy was useful in diminishing the severity of back pain during the course of their pregnancy.<sup>56</sup> In contrast, a prospective randomized study of 362 healthy pregnant women by Ostgaard et al. found that antenatal patient education and exercises in asymptomatic healthy women had no effect on the development, or on the regression, of back pain during subsequent pregnancies. The only subgroup that benefited from such interventions was pregnant women with a previous history of back pain.<sup>57</sup> Therefore, the use of antenatal back care education in healthy women does not appear to be of any great benefit.

### Treatment Options

**Patient Education.** Individualized education and training programs have been found to be effective in reducing absenteeism from work in women with back pain, but not in women with PGP.<sup>6</sup> Back care classes focus on educating women in the relevant anatomy, ergonomics, correct posture, pain management strategies, and relaxation techniques. Pregnant women with back pain should avoid fatigue, twisting while lifting, and unrelenting postures; maintain good upright posture; and take frequent periods of rest.<sup>7</sup> In addition, women with PGP should avoid activities such as jarring, bouncing, unequal weight bearing on legs (eg, while dressing), hip abduction, and activities that strain the joints to their extreme.<sup>31</sup> While turning in bed, knees should be flexed and squeezed together.<sup>33</sup> Although there are no studies in the literature that have evaluated patient information as a single intervention, providing adequate information and reassurance is considered useful.<sup>16</sup>

**Physical Therapy.** The use of devices as simple as a pillow in the shape of a nest has been found to be useful in decreasing pain and insomnia during late pregnancy.<sup>58</sup> The pillow supports the abdomen when the woman is in the lateral recumbent position and appears to relieve symptoms. Other devices that can be used include a lumbar roll placed behind the lower back (while resting with feet slightly elevated), abdomino-lumbar supports,<sup>59</sup> and sacroiliac belts.<sup>6</sup> Women should be encouraged to experiment with cushions and pillows of various sizes and shapes to support different parts of their body, such as their back, abdomen, and knees for pain relief.<sup>33</sup> Pelvic belts decrease the mobility of the SIJs and work most effectively when they are applied

just below the anterior superior iliac spines rather than at the level of the symphysis pubis.<sup>60</sup> There is no good quality evidence to support the use of nonelastic pelvic belts. Some women are apprehensive that the pressure from various abdomino-lumbar supports will have deleterious effects on the fetus, but such fears are unfounded, and the use of an abdomino-lumbar support is safe.<sup>61</sup> A pelvic belt may be fitted to test for symptomatic relief, but it should only be applied for short periods.<sup>16</sup> Other interventions include massage and local application of heat and cold. Field et al., in their quasi-randomized controlled trial carried out on a small group of 26 patients, found some benefit of massage in pregnant women with back pain.<sup>62</sup> Stuge et al., in their review of 1,350 patients, found no strong evidence regarding the effect of various physical therapy interventions for the prevention and treatment of PGP and PLBP.<sup>63</sup> This should not dissuade clinicians from using these simple harmless measures on their patients. There is no good quality evidence to support the use of pelvic manipulation, mobilization, or sacroiliac fusion, therefore, such extreme interventions cannot be recommended.<sup>27</sup> Other useful aids include elbow crutches, walking frames, and wheelchairs to assist mobility.

**Exercises.** Exercises appear to be beneficial mainly in patients with PLBP,<sup>6,64,65</sup> but their role in diminishing PGP during pregnancy remains uncertain. Our search revealed only one randomized controlled trial of high methodological quality in which specific diagnostic criteria for PGP were used. In this study on 118 pregnant women with PGP, it was found that pelvic stabilizing exercises neither decreased the pain intensity nor shortened the recovery period after delivery.<sup>66</sup> This could be related to the fact that the transverse abdominal muscles cannot be trained during pregnancy. The exercises recommended for PLBP are similar to those used in non-pregnant backache patients, with minor modifications for pregnancy.<sup>67</sup> Once the acute pain is settled, individually tailored back strengthening and stretching exercises can be started. Ostgaard et al. found that an individualized training program based on information, ergonomic advice, and exercises resulted in reduction of sick leave in pregnant women with back pain, but not in those with PGP.<sup>6</sup> Water gymnastics have also been found to be useful in diminishing back pain and sick leave in pregnant women.<sup>68</sup>

Exercise may however offer some benefit to women with PGP following delivery. Stuge et al., in a random-

**Table 4. Controlled Trials of Acupuncture**

First Author (Country)	Year	Patient Numbers Active + Control	Intervention in Control Group	Outcome
Wedenberg et al. <sup>74</sup> (Sweden)	2000	30 + 30	Physiotherapy: only 40% drop out from controls	VAS decreased by 60% in the acupuncture group vs. 31% in the physiotherapy group
Guerreiro da Silva <sup>75</sup> (Brazil)	2004	27 + 34	Standard Rx	NRS decreased by 50% in 78% of acupuncture group patients vs. 50% decrease in 15% of the controls
Kvorning et al. <sup>76</sup> (Sweden)	2004	37 + 35	Not known	VAS decreased in 60% of the acupuncture group vs. 14% of controls ( $P < 0.01$ )
Elden et al. <sup>77</sup> (Sweden)	2005	130* + 125† + 131‡	Standard Rx (information, pelvic belt) ± exercises	VAS decreased by 52% in acupuncture + standard Rx group vs. 8% in only standard Rx group vs. 26% in standard treatment + stabilizing exercises group
Lund et al. <sup>78</sup> (Sweden)	2006	25 + 22	Superficial acupuncture	No difference, ie, equal VAS decrease

\* Standard treatment.

† Standard treatment + acupuncture.

‡ Standard treatment + stabilizing exercises.

NRS, numeric rating scale; Rx, treatment; VAS, visual analog scale.

ized controlled trial on 81 postpartum patients with PGP, found specific pelvic girdle stabilizing exercises to be useful.<sup>69</sup> In contrast, Mens et al., in a randomized controlled trial on 44 patients with PGP, found no change in pain intensity and no difference in mobility of pelvic joints in women who performed diagonal trunk muscle exercises as compared with the control group.<sup>70</sup> In the latter study, the small sample size, poor supervision, and poor compliance with exercises probably influenced the results.<sup>66</sup>

**Transcutaneous Electrical Nerve Stimulation.** There are no randomized controlled trials of transcutaneous electrical nerve stimulation (TENS) in pregnancy except for in labor. There have been theoretical concerns about stimulation of certain acupuncture points (which have been used to induce labor), fetal malformations, and passage of current through fetal heart while using TENS. However, no negative effects have been reported from the use of TENS during any stage of pregnancy.<sup>71</sup> TENS can be used in pregnancy provided the usual precautions and contraindications are observed, the current density is kept low, and the acupuncture points used to induce labor are avoided.<sup>71</sup> According to a recent Cochrane review, there was limited and inconsistent evidence to support the use of TENS as an isolated intervention even in the management of chronic low back pain.<sup>72</sup> However, there is some evidence that TENS is better than giving no treatment in chronic low back pain (although this could have been a placebo effect).<sup>73</sup> Given the limited options available for pain relief during pregnancy, there appears to be no disadvantage in trying TENS. It is cost-effective, readily available, poses less risk than analgesic medications, and is less labor-

intensive than acupuncture. It should be used as a second-line treatment for PLBP/PGP, after advice on daily activities and exercises.<sup>71</sup>

**Acupuncture.** The use of acupuncture for PGP/PLBP is increasing.<sup>74–81</sup> Most studies are controlled trials of series of small numbers of patients, and they suffer potential bias from their lack of blinding of both the patient and the investigator (Table 4). The acupuncturist must avoid certain acupuncture points in pregnancy that supply the cervix and uterus (which have been used to induce labor), but the technique in general is considered to be safe. The majority of the older studies has found that acupuncture provides effective analgesia to women with PGP and/or PLBP in pregnancy.<sup>74–77,79</sup> A recent randomized double-blinded controlled trial in 115 patients diagnosed with PGP has shown that acupuncture had no significant effect on pain or on the degree of sick leave compared with nonpenetrating sham acupuncture, although there was some improvement in performing daily activities.<sup>82</sup> However, acupuncture has been widely shown to be of benefit in the management of chronic lower back pain.<sup>83,84</sup> Given its effectiveness for these conditions and the limited treatment options available during pregnancy, further high quality trials are needed to evaluate its use for PGP/PLBP. However, it is labor-intensive, with courses of treatment usually requiring at least 6 sessions with a trained practitioner.

**Pharmacotherapy.** There are no studies on the use of drugs in PGP/PLBP in pregnancy. Although paracetamol is considered safe in pregnancy, it does not seem to be very effective on its own for these conditions. The use of

nonsteroidal anti-inflammatory drugs (NSAIDs) is not associated with fetal malformations before 30 weeks of pregnancy.<sup>85</sup> However, the majority of women is unlikely to require treatment for PGP/PLBP in early pregnancy. NSAIDs are generally withheld in the last trimester of pregnancy because of the risk of premature closure of the ductus arteriosus and the risk of oligohydramnios.<sup>85</sup> A prospective observational study on 88 pregnant patients with rheumatic arthritis did not however reveal any immediate or long-term effects on the infants of the 45 women who were treated with a standard dose of NSAIDs for a mean duration of 15.3 weeks (the drugs were stopped 4 to 6 weeks before delivery).<sup>86</sup> NSAIDs can be used safely after delivery in breast-feeding mothers.

Opioids such as morphine, codeine, meperidine, tramadol, hydrocodone, fentanyl, propoxyphene, and oxycodone are included in category C of the pregnancy risk category by the “Food and Drug Administration.”<sup>87-89</sup> Category C includes drugs that have been shown to pose fetal risk in animal studies, where there are no well-controlled human studies and the benefits from the use of the drug in pregnant women may be acceptable despite its potential risks.<sup>90</sup> Morphine, meperidine, codeine, and propoxyphene in early human pregnancy have not been found to be associated with any increased risk of fetal malformations.<sup>91</sup> The use of opioids in late pregnancy and in breast-feeding mothers can result in respiratory depression in the neonate, and withdrawal effects in newborns of mothers on long-term opioids.<sup>92</sup> There is little evidence upon which to base the use of opioids to alleviate the pain of PGP/PLBP, but small doses, especially at night, may help to provide nocturnal pain relief and a better quality of sleep.

**Epidural Analgesia.** There is a potential role for epidural analgesia in the management of severe PGP/PLBP, but it has not been properly evaluated and the evidence, as it is, is restricted to a few isolated case reports.<sup>93,94</sup> In the first case, single-shot epidural morphine was given, and in the second intermittent, epidural top ups of bupivacaine and fentanyl were given through an indwelling epidural catheter (for 72 hours) with good results.<sup>93,94</sup> If epidural is to be used for analgesia in PGP/PLBP, then there is a likelihood of needing an epidural infusion through a long-term indwelling epidural catheter. This can be associated with tachyphylaxis and risks such as motor block (can interfere with the patient’s mobility), hemodynamic instability, respiratory depression, pruritis, and urinary retention, with possible consequences

for both the mother and the baby. This extreme approach might have a place in patients with severe PGP for symptom control while awaiting fetal maturation, thereby avoiding premature induction/cesarean section.

## MANAGEMENT OF LABOR

Our search did not reveal any studies on the management of labor in women with PGP/PLBP. “The Association of Chartered Physiotherapists in Women’s Health” has produced guidelines for the management of labor in women with PGP.<sup>7</sup> It recommends avoiding undue abduction of hips during labor in the affected women (especially under the pain-masking effect of spinal/epidural anesthesia) to prevent further damage to the pelvic girdle joints. It further recommends promoting the most comfortable position for the mothers during labor, vaginal examination, operative vaginal delivery, and suturing. This is likely to be a lateral position or on “all fours.” If lithotomy position is needed, it should be maintained for as short a duration as possible, and care should be taken to ensure simultaneous movement of legs into, and out of, this position. For assisted vaginal delivery, ventouse is preferable. Cesarean section does not confer any benefit on outcome but may be the only option in women in whom there is severe pain and limitation of movement, making comfortable birthing position practically impossible. Following birth, it suggests that women start on analgesics or anti-inflammatory medications. Once the pain is controlled, and after a period of bed rest, women should gradually mobilize within pain limitation, using aids such as pelvic supports/elbow crutches.<sup>7</sup>

## PROGNOSIS

PGP is usually a self-limiting condition, and symptoms generally resolve within a few weeks to a few months after delivery. Risk factors associated with *long-term* PGP include prepregnancy back pain, prolonged duration of labor,<sup>20</sup> a high number of positive pain provocation tests, a low mobility index,<sup>19</sup> the onset of severe pain at early gestation, and inability to lose weight following delivery to the prepregnancy level.<sup>95</sup> Women with complete PGP (pain in symphysis pubis and both SIJs) have the worst long-term prognosis.<sup>19</sup> About 8% to 10% of the women with PGP continue to have pain for 1 to 2 years.<sup>18-20</sup> Although PGP/PLBP tends to recur in future pregnancies, there are no studies in literature that have shown PGP/PLBP to be associated with future back pain without pregnancy.



## RECOMMENDATIONS FOR FURTHER RESEARCH

There are widespread misconceptions about PGP/PLBP; studies are needed to explore whether health promotion programs can prevent these, and cost-benefit implications of these programs need to be analyzed. Good quality studies on different forms of interventions, including their risk-benefit and cost-benefit analysis, should be carried out. Studies should be carried out on the association of psychosocial factors and the role of cognitive-behavioral treatment in PGP/PLBP.

## CONCLUSION

PGP and PLBP are common problems, but they are often underestimated and undertreated. A large number of terms for these conditions have been used in the literature, and there is a need for a uniform terminology in order to promote research and management of these conditions. Major risk factors for PGP and PLBP include strenuous work, previous low back pain, previous history of PGP or PLBP, and previous trauma to the pelvis. The diagnosis of PGP is clinical, based on the pain characteristics, functional impairment, positive pain provocation tests, and exclusion of lumbar causes of pain. Care should be taken not to exceed the pain-free range of abduction of hips in affected women, especially during labor. Individualized treatment in the form of patient education, exercises, pelvic belts, analgesics, and acupuncture can be of benefit. Further research is needed into the use of different forms of treatment such as acupuncture, TENS, and epidural analgesia, either in isolation or as complementary interventions for the safe and effective management of these conditions.

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