

## Pregnancy-related low back pain

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### Abstract

Pregnancy related low back pain is a common complaint among pregnant women. It can potentially have a negative impact on their quality of life. The aim of this article is to present a current review of the literature concerning this issue.

By using PubMed database and low back pain, pelvic girdle pain, pregnancy as keywords, abstracts and original articles in English investigating the diagnosis treatment of back pain during pregnancy were searched and analyzed

Low back pain could present as either a pelvic girdle pain between the posterior iliac crest and the gluteal fold or as a lumbar pain over and around the lumbar spine. The source of the pain should be diagnosed and differentiated early. The appropriate treatment aims to reduce the discomfort and the impact on the pregnant woman's quality of life. This article reveals the most common risk factors, as well as treatment methods, which may help to alleviate the pain. Some suggestions for additional research are also discussed. Hippokratia 2011; 15 (3): 205-210

**Key words:** low back pain, pelvic girdle pain, pregnancy, review

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Low back pain (LBP) is a common complaint amongst women during pregnancy, having a great impact on their quality of life. Low back pain during pregnancy has been known and recognized for many centuries and was described by Hippocrates, Vesalius, Pineau, Hunter, Velpeau and many others. In 1962 Walde was the first who recognized the differences between Pelvic Girdle pain (PGP) and Lumbar pain (LP). Later, Ostgaard et al. set the criteria for the differentiation between these two entities<sup>1</sup>. It has been estimated that about 50% of pregnant women will suffer from some kind of low back pain at some point during their pregnancies or during the postpartum period<sup>2-4</sup>. Pregnancy related low back pain, seems to be a result of quite a few factors, such as mechanical, hormonal and other<sup>2, 3, 5-12</sup>.

PGP and LP are two different patterns of LBP during pregnancy, although, a small group of women suffer from combined pain. PGP is common during pregnancy and postpartum period and approximately four times as prevalent as LP. It is described as deep, stabbing, unilateral or bilateral, recurrent or continuous pain, presenting between the posterior iliac crest and the gluteal fold, possibly radiating to the posterolateral thigh, to the knee and calf, but not to the foot<sup>13</sup>. PGP is more intense during pregnancy than during postpartum period and may convert the natural discomfort of pregnancy into a pathophysiologic condition, which minimizes physical activity, and causes withdrawal from social interactions<sup>14</sup>. Pain provocation tests are the best tests available for differentiating PGP from other conditions. The posterior pain provocation test

(PPPT) is positive, in case of PGP<sup>2, 3, 6, 15, 16</sup>.

LP during pregnancy is very similar to lumbar pain experienced by women who are not pregnant and it appears as pain over and around the lumbar spine, above the sacrum, making the differentiation between PGP and LP easy. LP may or may not radiate to the foot, in contrast with PGP. Tenderness over paravertebral muscles is a common finding<sup>14</sup>. LP aggravates at postpartum period and usually exacerbates by certain activities and postures (e.g. prolong sitting) but it seems to be less disabling than PGP<sup>14</sup>. The posterior pain provocation test is negative<sup>3</sup>.

LP and PGP should be diagnosed and differentiated early, since the treatment is different for each condition. Detailed history and clinical examination are essential<sup>17</sup>. Although motion palpation findings have limited value in differential diagnosis, it is one of the most commonly used diagnostic tools. Notably, its sensitivity, specificity and validity in general have not been adequately studied<sup>18</sup>.

Pregnancy related low back pain affects women's lives dramatically. Low back pain is the most common cause of sick leave after delivery<sup>2, 3, 7, 8</sup>. Taking under consideration the individuality of every woman and pregnancy, early identification and treatment will lead to the best possible outcome. Conservative management is the gold standard including physiotherapy, stabilization belts, nerve stimulation, pharmacological treatment, acupuncture, massage, relaxation, and yoga<sup>2, 3, 8, 19, 20</sup>. In general, pregnancy related low back pain has a benign prognosis provided that early recognition and treatment have been made. The aim of this article is to review the related stud-

ies reporting their clinical data for the diagnosis and management of pregnancy related back pain, and to highlight specific treatment recommendations.

### Prevalence

There has been a plethora of studies regarding the epidemiology of pregnancy-related LBP. Rates range from 25% to 90%, with most studies estimating that 50% of pregnant women will suffer from LBP. One third of them will suffer from severe pain, which will reduce their quality of life. The majority of women are affected in their first pregnancy<sup>21</sup>. Eighty percent of women suffering from LBP claim that it affects their daily routine and 10% of them report that they are unable to work<sup>22</sup>.

Twenty percent of pregnant women will experience PGP. Pregnancy related LBP usually begins between the 20<sup>th</sup> and the 28<sup>th</sup> week of gestation, however it may have an earlier onset. The duration varies. A study about PGP in Netherlands shows that 38% of women still have symptoms at 3 months postpartum and 13.8% at 12 months<sup>23</sup>. LBP during pregnancy is considered to be the most important risk factor for postpartum LBP and the existing literature supports LBP as the leading reason for sick leave, as far as pregnant working women are concerned<sup>2-4</sup>.

### Etiology

Many studies have been conducted in various populations regarding LBP during pregnancy. However, the subject remains controversial and the etiology is poorly understood. Various explanations on the pathophysiology leading to LBP in the antenatal period have been advocated, although the scientific basis of those hypotheses is far from consolidated.

One of the most frequent mechanisms suggested, is associated with the mechanical factors, due to weight gaining during pregnancy, to the increase of the abdominal sagittal diameter and the consequent shifting of the body gravity center anteriorly, increasing the stress on the lower back<sup>3,8,9,11</sup>. Studies suggest that an anterior shift is associated with pubic symphysis problems<sup>8</sup>. Postural changes may be implemented to balance this anterior shift, causing lordosis and increasing stress on the lower back<sup>24</sup>. The connection between LBP and PFD (Pelvic Floor dysfunction) has been suggested. A negative Active Straight Leg Raise test (ASLR) in combination with a positive PPPT may be interpreted as an increased activity of the pelvic floor muscles, in order to compensate for the impaired pelvic stability<sup>12</sup>.

Another important consequence of the mechanical alterations during pregnancy is the response of the intervertebral discs in axial loading, leading to decreased height and compression of the spine. This results in major compression of pregnant women spine with LBP after activity, which also takes longer to recover, in relation to women without LBP<sup>8</sup>.

In addition, a biomechanical process suggests that the abdominal muscles of the pregnant woman stretch to

accommodate the enlarging uterus, causing muscle fatigue and resulting to an extra load on the spine, which is charged with the task of supporting the majority of the increased weight of the torso<sup>3,8</sup>. According to some initial pilot data, weakness of the gluteus medius is strongly related to the presence of LBP during pregnancy<sup>5</sup>.

A significant proportion of women firstly experience pain, during the first trimester of pregnancy. In these latter cases, in which there is no disease or trauma to initiate the condition, mechanical changes do not yet play any role in the pain induction, producing no sound conclusion concerning the onset of a significant number of cases of LBP. So, it has been suggested that during pregnancy the female body is exposed to certain factors causing dynamic instability of the pelvis, and that LBP may be secondary to hormonal changes. Relaxin increases tenfold during pregnancy causing ligamentous laxity and discomfort, not only in the sacro-iliac joint, but also generalized discomfort, pain of the entire back, instability of the pelvis and misalignment of the spine. The association between circulating levels of the hormone relaxin and LBP in pregnancy is under debate, since many studies do not confirm any correlation between relaxin serum levels and severity of symptoms of LBP during pregnancy<sup>2,3,6-10</sup>.

Another theory suggests that LBP during pregnancy, which worsens at night, may be the consequence of the expanding uterus putting pressure on the vena cava causing venous congestion in the pelvis and the lumbar spine<sup>8</sup>.

Sciatica is a rather rare clinical entity of LBP during pregnancy, appearing in only 1% of women. Sciatica may be the result of herniation or bulging of an intervertebral disc, causing nerve compression<sup>8</sup>. Rare causes of sciatica should also be deemed when there is no evidence of disc disease<sup>25</sup>. In a small group of women, the persistent pain during postpartum period may be secondary to osteitis condensans ilii<sup>26</sup>.

### Differential Diagnosis

The diagnosis of LBP during pregnancy and the differentiation between LP and PGP is usually based on symptoms, due to the few existing diagnostic tests. The subjectivity of the pain and the disability caused by back pain makes the evaluation more difficult<sup>8</sup>.

Physical examination, can distinguish LP and PGP, since these entities present differences in the location of pain and the results of provoking tests. PPPT, which was proposed by Ostgaard et al<sup>27</sup> is performed with the patient lying in the supine position and the hip at 90 degrees of flexion. Pressure is applied at the knee along the long axis of the femur, while the pelvis is stabilized at the contralateral anterior iliac spine. A positive test provokes gluteal pain on the ipsilateral side. PPPT has a positive predictive value of 0.91<sup>27</sup>. It is positive in case of PGP. Patrick-Febere test also elicits PGP. There are several other provocation tests used to differentiate LP from PGP. Studies have been using the clinical ASLR, (a test performed in the supine position with the patient raising one leg with the knee extended), which rates the impairment, proving

that patients suffering from LBP use significantly more muscle activity, but produce less force, compared to the healthy groups<sup>25</sup>.

Pregnancy Mobility Index (PMI) was developed by Van de Pol et al to assess the ability of doing normal household activities. It is a validated self-report questionnaire, consisting of three scales and it is used on pregnant women to evaluate mobility and quality of life in relation to LBP and/or PGP<sup>28</sup>. Disability because of LBP and/or PGP is often measured using the Quebec back pain disability scale<sup>8</sup>.

A deferentiate diagnosis between back pain and pelvic instability pain should also be made. During pregnancy pelvic ring widening normally appears<sup>29</sup>. This situation is normally asymptomatic and resolves spontaneously. Sometimes unfortunately pelvic instability may be caused especially when symphysiotomy or forceful expulsion is used during the delivery. The last «tool» for the management of the obstructed labor and shoulder dystocia is symphysiotomy<sup>30</sup>. According to Chalidis and all some major principles should be ensured such as vertical incision through cartilage, symphysis pubis opening smaller than three cm, gradual mobilization to avoid major complications during and after symphysiotomy<sup>31</sup>. The degree of pelvic ring instability determines and the proper treatment<sup>32</sup>. Large symphyseal separations more than 4 cm symphysis pubis fusion and sacroiliac fixation may be required. An early intervention- if surgery is indicated- in order to minimize long term morbidity should be performed.

### Risk factors

Research on primary care population suffering from back pain has shown that Oswestry Disability Index (ODI) and Visual Analog Score (VAS) questioners are predictive of long-term morbidity. At the same studies pregnancy has been reported as a major risk factor. The ODI, EuroQol and pain VAS instruments may assist in the early identification of pregnant women at risk for long-term problems<sup>8,33</sup>.

There has been a lot of debate concerning the risk factors of LBP during pregnancy and many contradictory articles have been published.

It seems that history of pelvic trauma, chronic LBP and low back pain during a previous pregnancy are the most common and widely accepted risk factors<sup>8</sup>. Eighty five percent of women with back pain in a previous pregnancy will develop back pain in a subsequent pregnancy<sup>1,34,35</sup>. The number of previous pregnancies also seems to increase the risk<sup>36</sup>. It is not possible to estimate the risk, or to predict who will suffer from LBP during pregnancy, however, women with a history of LBP before pregnancy, are most likely to suffer from more severe pain and of a longer duration after childbirth. LP is more strongly connected with back pain history before pregnancy, compared to PGP. LBP during menstruation is an additional risk factor for pregnancy related LBP<sup>21</sup>. On the contrary, exercise on a regular basis before the pregnancy seems

to reduce the risk of suffering from LP during the pregnancy. However, the same it is not true for PGP<sup>2,3,33,37</sup>. It has been published that the socio-economic status of the country plays no role as far as PGP amongst pregnant women<sup>38</sup>. Diagnosed hypermobility was more common in women with LBP<sup>39</sup>. However, Dongen et al found no significant correlation between joint hypermobility and the incidence of PGP<sup>6</sup>. A study using the Roland questionnaire suggests that the male sex of the fetus may be a predictive factor for back pain during pregnancy<sup>40</sup>. Mac Lennan et al. suggests that PGP is associated with dysplasia of the hip and a genetic susceptibility of the hip both of the mother and of the child<sup>41</sup>.

There is relative agreement that excessive body weight may be a risk factor for LBP during pregnancy<sup>42</sup> however, there are studies claiming that being overweight is not a risk for pregnancy related LBP<sup>2,4</sup>. Contraceptive pills and time interval since the last pregnancy are not considered as risk factors for LBP during pregnancy<sup>2</sup>.

The association between the woman's age or between high workload and low back pain during pregnancy remains unclear<sup>2,3,21</sup>. Finally, it seems that epidural or spinal anesthesia during labour is not associated with a higher risk of persistent postpartum LBP<sup>43</sup>.

### Prevention

Although it is rather difficult to prevent LBP, it is very important to inform future mothers, especially those on high risk to expect the discomforting symptoms of LBP and encourage them to follow some method as to reduce the possibility of suffering from pregnancy related LBP<sup>4</sup>.

Pregnant women should be educated on how they can maintain a proper posture, while doing everyday activities, so that their back is not overloaded and misaligned. That can be easily performed if practiced and can be enhanced by aerobic or physiotherapy exercises, preferably before pregnancy. It has been proven that a 12-week training program during pregnancy is effective in the prevention of LBP, at 36 weeks of pregnancy<sup>44</sup>. Physical activity before pregnancy is correlated with a decreased risk of developing LP, which does not apply to PGP<sup>13</sup>. Another study proves that there is an association between muscle dysfunction and women who develop persistent PGP<sup>45</sup>. It is also very important for women to learn how to lift weights without stressing their backs, a habit that can be proven very useful throughout pregnancy. Women should be advised to use proper seats, cushions and beds, as well as techniques for getting in and out of bed, so that the body maintains in a proper position and the spine is supported and not stressed<sup>3</sup>.

### Prognosis

The most important factor among others that aggravates low back pain during pregnancy is the actual progression of pregnancy<sup>46</sup>.

The prevalence of LBP rapidly declines during the first trimester post delivery. In general the prognosis is good for most women with pregnancy related LBP. How-

ever, women with combined pain show the lowest recovery level. Combined pain during pregnancy is a predictor for persistent PGP or combined pain postpartum<sup>47</sup>. One of the most important risk factor for postpartum LBP is previous pregnancy related LBP. It seems that pain intensity is higher amongst women with postpartum LBP who experienced LBP during pregnancy. Whereas PGP is more intense and disabling during pregnancy, LP appears to be more severe and more common after childbirth. In general, the intensity of the pain is a prognostic factor<sup>14</sup>. Overall, results indicate that postpartum LBP is a temporary disorder with a good prognosis, especially during the first months after childbirth<sup>2,8,16,48</sup>. This prognosis is not negatively affected by a caesarean section, however during the last decade there has been a debate concerning this matter<sup>13</sup>. On the other hand, there are studies suggesting that women with high postpartum weight gain and weight retention may be at higher risk for postpartum LBP. So, weight reduction may reduce the incidence of postpartum LBP<sup>9</sup>. Depressive symptoms have a negative effect on the prognosis<sup>23</sup>. The contribution of training and physiotherapy in the prevention of postpartum LBP is still under debate<sup>33,49</sup>. It seems that a postpartum tailor-made intervention is more effective<sup>48</sup>. ASLR test and the belief in improvement are predictors of clinical significance in women having PGP postpartum<sup>50</sup>. Provocation tests are not as reliable during postpartum period as they are during pregnancy<sup>15</sup>.

### Management

Most women consider LBP as an inevitable, normal discomfort during pregnancy. Only 50% of women suffering from pregnancy related LBP will seek advice from a health care professional and 70% of them will receive some kind of treatment<sup>51</sup>. Early identification and treatment, taking under consideration the individuality of every woman and pregnancy, provide the opportunity for the best possible outcome. LBP has a very good functional prognosis and most women recover during the first months after childbirth. Conservative management of LBP is the treatment of choice. A correct diagnosis and a differentiation between PGP and LP are of the utmost importance, since the treatment is different<sup>2,3,8</sup>. Some of the treatment options are physiotherapy, stabilization belts, nerve stimulation, pharmacological treatment, acupuncture, massage, relaxation, and yoga<sup>8</sup>. Weight loss strategies during postpartum and prevention of weight gain may help to prevent the risk and the severity of LBP (Table 1)<sup>20</sup>.

There are studies demonstrating that sterile intradermal water injections induce a significant, dramatic analgesic effect for women that experience LBP during labour, lasting from 10 minutes and up to 2hours post-administration. Sterile water injections have proved to be a justifiable alternative to the use of narcotics for birthing women and their midwives who are concerned about unwanted side effects on both mother and child. Their effect has been described as powerful, rapid and effective;

**Table 1:** Basic management of LP (Lumbar Pain) and PGP (Pelvic Girdle Pain).

Basic Management of LP	Basic Management of PGP
Exercising e.g. pacing, swimming	Minimize activities that exacerbate pain, e.g. climbing stairs
Back support while sitting e.g. pillow	Rest during episodes of pain
Use of footstool	Use of sacral belt
Rest at midday	Modify sitting to avoid overflexion of hips and spine
Avoidance of prolonged sitting	Support legs when lying e.g. pillow

with the potential to decrease or delay the use of epidural anaesthesia<sup>19</sup>.

Acupuncture seems to alleviate LP and PGP during pregnancy, while it increases the capacity for some physical activities and helps diminish the need for drugs, which is a great advantage during this period. Patients who have received a 1-week continuous acupuncture treatment at specific auricular points had a significant reduction in pain compared with those of the sham acupuncture and control groups, but the treatment effect was not sustained in some of the pregnant women. Thus, long-term efficacy of auricular acupuncture treatment for LBP is still inconclusive but clearly promising<sup>52</sup>.

The commonest practice in managing LP is exercising. Many relevant studies have been published, describing several fitness activities, such as individualized physical therapy, physiotherapy in groups, yoga, and water aerobics. However, there is no strong evidence concerning the effect of physiotherapy and fitness activities such as weight lifting or using the stairs, in combination with an exercise program. There is a great need for future studies, in order to consider whether a fitness activity program is required before pregnancy, in the line of prevention and in order to assess the type and duration of intervention. Further, the interference of the cost must be taken under consideration in comparison with not following any exercise program at all for managing LP<sup>7,15,49,53-56</sup>. The use of a footstool, a back support while sitting and the avoidance of work that can cause muscle fatigue, are encouraged. The education of the pregnant woman is very important, so that she learns how to stand, walk or bend without causing an extra stress on the spine or muscle fatigue. Women are also encouraged to take a midday rest to relieve their muscles and to avoid prolonged walking or standing. In the line of an individualized treatment program, massage might be helpful, as well as acupuncture. Some studies advocate that acupuncture may be a complement to the existing management of LP, since it helps to reduce LP during pregnancy. However, the efficacy of the method

in general remains unconfirmed<sup>3, 8, 10, 57, 58</sup>.

The basic management of PGP is different from that of LP. Everyday activities and exercising, which aggravate symptoms, should be avoided. During acute episodes of PGP, brief rest and lying in bed can be useful. Some exercises for bed rest, such as using pillows to support the legs and squeezing the legs together when rolling, can be useful as well. Over flexion of the hips and the spine should also be avoided, while sitting. The use of a sacral belt helps to alleviate symptoms. Return to heavy activities and exercising should be avoided for several months postpartum<sup>8</sup>. Pharmacological agents are not mentioned in the literature as a possible alternative treatment during pregnancy. In cases of persistent pain combinations of therapies from various complementary and allopathic treatments should be followed<sup>27</sup>.

### Conclusion

LBP is one of the most common musculoskeletal complaints of pregnant women. For some women it may be the outburst of chronic low back pain and for others may be disabling pain during pregnancy and for a variable period postpartum. LBP during pregnancy may be the result of mechanical, hormonal and other factors, associated with the changes of the body. Literature clearly indicates that LBP may be disabling, limiting everyday activities, impacting productivity and should not be ignored or left untreated.

Although it may not be possible to cure LBP in some cases of persistent LBP, it can be adequately reduced. Early identification and treatment, that takes under consideration the individuality of each woman and pregnancy, provide the best opportunity for the best possible outcome. A correct diagnosis and a differentiation between PGP and LP are of the utmost importance, since treatment is different. Treatment options include exercising, physiotherapy, stabilization belts, nerve stimulation, pharmacological treatment, acupuncture, massage, relaxation, and yoga, depending on the case. A more vigorous treatment should be applied in more serious cases, associated with neurologic complications, such as disc herniation or mass.

Given the high incidence of LBP during pregnancy, larger studies are needed, in order to test prevention and treatment options in broader populations and contribute to improving woman's health.

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