

# Pregnancy-related lumbopelvic pain: Prevalence, persistence, risk factors and management implications

## Abstract

Symphysis pubis dysfunction (SPD)/Pregnancy-related lumbopelvic pain (PLPP) is a common condition with a prevalence range of 14–85% (Larsen et al, 1999; Orlikowski et al, 2006). In the literature, a number of terms and definitions have been employed by professionals from different countries to describe this condition. Women report a wide range of symptoms and there is a requirement for a careful assessment. The goal of this paper has been to raise awareness of the pain and activity limitations reported by some women during pregnancy and postpartum. The clinical presentation and women's experiences are described. The risk factors predisposing women to SPD/PLPP both during pregnancy and postpartum are presented. There is a requirement to meet the expectations of women with SPD/PLPP. Women need to be assessed, be able to tell their story, have the condition explained, and be involved in the management of their symptoms and activity limitations. Midwives play a key role in assessing for SPD/PLPP, so this paper proposes a five-step plan to guide midwives and doctors in the management of this condition.

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This article discusses the aetiology, terms and definitions of symphysis pubis dysfunction (SPD), also known as pregnancy-related lumbopelvic pain (PLPP). The terms SPD and PLPP refer to conditions with a similar clinical presentation (Wu et al, 2004; Shepherd, 2005). A number of terms have been used in the literature to describe SPD/PLPP and these are discussed later. It is the authors' impression that the term PLPP better describes the clinical presentation of this condition than the term SPD. This is because the term PLPP infers pain around the pelvis and lower back, where the underlying mechanisms maybe multifactorial (Wu et al, 2004). Conversely SPD infers a condition; characterised primarily by biomechanical dysfunction in one joint and this description is not totally accurate (Nilsson-Wikmar et al, 2003; Shepherd, 2005; Albert et al, 2006; Gutke et al, 2011).

This article presents an overview of SPD/PLPP with the main goals being; to better recognise and understand this condition and; to provide the reader with simple strategies to help manage this condition. To recognise and understand this condition requires acknowledging the prevalence,

risk factors and symptoms women report. To manage this condition requires applying knowledge relating to the physical and mental changes that occur during pregnancy with an understanding of the mechanisms that contribute to SPD/PLPP. The reason that this is required was summarised by Wellock and Crichton (2007) who reported that many women in their study were 'shocked by the pain they experienced'

Prevalence of SPD/PLPP during pregnancy ranges from 14% – 85% with a higher prevalence tending to be towards the expected date of birth (Larsen et al, 1999; Orlikowski et al, 2006). The prevalence of postpartum pain at 3 months and 3 years has been recorded as >40% and 23% respectively (Turgut et al, 1998; Norén et al, 2002; Woolhouse et al, 2012). It is suggested that the discrepancy in the prevalence rates is considered to be so diverse due to the different terms used, and definitions and methodologies employed in the studies. It might be assumed from these statistics that pregnancy-related back and pelvic pain and postpartum pain are common. It would appear from the experiences of some women that health professionals considered pain to be such a common feature in pregnancy that they were dismissive of symptoms and told women they would need to put up with it until after the birth (Wellock and Crichton, 2007). It has been suggested that where health professionals are unable to recognise or understand a condition it may be easier for them to tell the person it will improve rather than making an appropriate referral. This is not an unusual response. The attitudes of health professionals towards the experience of pain have received considerable attention, across a number of specialities. It has been found that inadequate education is frequently cited as the main reason why health professionals are dismissive of pain symptoms (Watt-Watson et al, 2009; Briggs et al, 2011; Way, 2012). However, this type of pain should not be dismissed as it significantly impacts on quality of life for some people and may lead to considerable socioeconomic cost as a result of absenteeism from work (Norén et al, 1997; Sydsjö et al, 1998; Gutke et al, 2011).

## Terminology and definitions

A number of terms have been employed by professionals in different countries to describe PLPP and SPD (Allsop, 1997.). These include posterior pelvic pain (Ostgaard et al, 1994); symptom-giving pelvic relaxation in pregnancy (Larsen et al 1999); pregnancy related back and pelvic pain (Björklund et al, 1999a); lumbar and posterior pelvic pain during pregnancy (Norén et al, 1997); peripartum pelvic pain syndrome (van Dongen et al, 1999) and pregnancy-related pelvic girdle pain (Van de Pol, 2007). Furthermore, there is controversy relating to the definition of pelvic and low back pain in pregnant women. There have been attempts to categorise and differentiate those suffering pregnancy-related low back pain and those with pregnancy-related posterior pelvic pain (Vleeming et al, 2008). However, many women appear to report a combination of either pain in the pelvic joints or low back or both (Nilsson-Wikmar et al, 1999). There appears to be little difference in the function and long-term prognosis of those reporting either pregnancy-related pelvic or low back pain (Brynhildsen et al, 1998; Wu et al, 2002). In addition, it would appear that little distinction is made in the literature between the locations of the pain perceived. Therefore, in common with the review by Wu et al (2004), pregnancy-related pelvic girdle pain and low back pain will be referred to using the generic term, pregnancy-related lumbopelvic pain (PLPP).

## Aetiology

The aetiology of PLPP is poorly understood although the following hypotheses have been contributed and include mechanical, hormonal, traumatic, degenerative and metabolic factors. These have been summarised in the following reviews (Wu et al, 2004; Vermani et al, 2009; Kanakaris et al, 2011). To the authors' knowledge, the aetiology of persisting pain mechanisms during the postpartum period have not been hypothesised, although central pain mechanisms associated with persistent pelvic pain not associated with pregnancy have been discussed (Stacy et al, 2012). It is possible that peripheral and central neuropathic mechanisms contribute to central sensitisation in some women before, during and after pregnancy. The aetiology of the pain reported in those with PLPP has been further confounded as there is little consensus over the terminology and definitions; in addition, the focus has tended to be on the locality and the tissues involved. However, it is recognised that PLPP may persist after delivery.

Persistent pain also referred to as chronic pain is described as pain that continues after tissue healing has occurred following an initial pain provoking incident. The pain may be described as continuous or recurrent. A diagnosis of chronic/persistent pelvic pain is considered if a woman has suffered pain over a consecutive 6-month period. The reason that a longer time span is recorded (the general time span is 3 months) is to take into account the cyclical nature of pelvic pain in women (International Association for the Study of Pain (IASP), 2011).

## Clinical presentation

The symptoms women present with are heterogeneous and occur on a continuum. For some this continuum represents mild discomfort, while others report severe pain and discomfort affecting activities of daily life. Pain and the activity impairments are salient features for women with PLPP and may be described using the following terms; intensity; frequency; nature; sites and activity limitations. The intensity of the pain described varies between mild, moderate and severe. The frequency has been referred to as either recurrent or continuous (Woolhouse et al, 2012). The nature of the pain has been described as stabbing, cutting, dull or aching (Nilsson-Wikmar et al, 2003; Shepherd, 2005; Orlikowski et al, 2006; Mogren, 2008)

The various sites that women have reported pain in are as follows:

- All three pelvic joints (two sacro-iliac joints and symphysis pubis joint)
- Symphysis pubis joint only
- Symphysis pubis joint with pain radiating into the upper thigh and perineum
- One-sided sacro-iliac joint pain (posterior pelvic joint)
- Bilateral sacro-iliac joint pain (posterior pelvic joints)
- Lower back pain
- Lower back pain and pelvic pain (sacro-iliac joints and or symphysis pubis joint)
- Miscellaneous pain

(Nilsson-Wikmar et al, 2003; Shepherd, 2005; Albert et al, 2006; Gutke et al, 2011).

Women have reported pain when performing the following activities: lying, parting or lifting the legs; turning in bed; getting up from a chair or bed; walking; climbing stairs; lifting light loads; housework; childcare; and shopping (Larsen et al, 1999; Nilsson-Wikmar et al, 2003; Shepherd, 2005). The range of symptoms and activity limitations which some women with PLPP complain about, highlights the need for a careful and comprehensive assessment.

### Prevalence of PLPP during pregnancy and at the time of delivery

The prevalence of PLPP reported during pregnancy and/or at the time of delivery was variable and dependent on the definitions employed and at which stage of the pregnancy the questionnaire was administered. Orlikowski et al (2006) defined pain using the terms moderate, severe or mild. The term mild was defined if the women reported pain but had not consulted a health professional and if the pain had not interfered with their activities. Moderate was defined if a health professional had been consulted but the women were able to continue with most activities. Severe was defined as requiring medication, severe restriction of activities and included taking time off work. In this cohort of 992 nulliparous women, 85% reported PLPP of whom 57% reported their PLPP as moderate or severe. Larsen et al (1999) defined disabling pelvic pain as that recorded when a woman reported arising from two of the following five situations: turning in bed; walking; lifting; rising from a chair and; climbing stairs. In this cohort of 1600 women 19% reported disabling pain starting from the 16th week onwards. Mogren (2006) did not define the severity of PLPP in this multiparity cohort of 891 women, but reported a prevalence of 72% at some stage in their pregnancy. Woolhouse et al (2012) did not report PLPP severity but recorded a prevalence of PLPP at the time of delivery as 29% in a cohort of 1507 nulliparous women.

In the studies described above (Larsen et al 1999; Mogren 2006; Orlikowski et al 2006; Woolhouse et al 2012), there was no consensus on how pain was defined or the stage of the pregnancy at which this information was collected. Nevertheless, pain in the pelvis and low back region appears to be common and it is apparent that there is a high prevalence of women reporting moderate to severe pain and limitations in their activities, impacting on their ability to function at home or at work. In addition, these women may be at risk of postnatal depression, as Jardri et al (2010) found that women with higher pain intensity recorded immediately post delivery and again at 2 months were estimated by midwives to be at risk of postnatal depression.

### Prevalence of PLPP postpartum

Higher pain intensities recorded by women during pregnancy and delivery were more likely to have been reported in those with a history of back pain pre-pregnancy (Turgut et al, 1998). In

addition, in this same cohort of women reporting PLPP during pregnancy, 43% continued to report PLPP at 6 months. Larsen et al (1999) reported a similar prevalence of postpartum pain at 2 months (46%) and of these two thirds continued to report PLPP at 6 months. Orlikowski et al (2006) reported that half the women who reported pain in pregnancy continued to report PLPP at 6 months postpartum. They were able to report that PLPP was no more frequent in women following intrapartum epidural analgesia compared with women who had non-epidural analgesia. This echoes a previous finding by Butler and Fuller (1998). These studies suggest that women experiencing unrelieved pain during pregnancy are more likely to experience persistence of chronic PLPP after childbirth. This concurs with other studies carried out following surgery which have consistently found that pain pre-operatively poses an increased risk for developing persistent pain post-operatively (Kehlet et al, 2006).

Some studies recorded a decrease in the prevalence of PLPP with time, but Woolhouse et al (2012) reported a similar prevalence at 3, 6, 12 and 18 months as 47%, 49%, 44% and 42% respectively. Additionally, 63% of the women who reported pain at each time point had reported lower back pain in the 12 months prior to pregnancy. This shows the persistent nature of their pain presentation.

It is apparent from these studies that persistent pain appears to be a phenomenon in those reporting PLPP. Research studies suggest that women who develop PLPP may be at risk for reporting increased pain intensity during pregnancy and delivery and for developing persistent pain (Turgut et al, 1998; Larsen et al, 1999; Orlikowski et al, 2006; Woolhouse et al, 2012). It is important to identify risk factors for PLPP so that health professionals are able to recognise those at risk. Further studies are required to enhance our understanding of this phenomenon and therefore to guide future management.

### Risk factors for PLPP during pregnancy and postpartum

Table 1 presents a summary of research studies which have identified risk factors found to predispose women to PLPP. The list is not exhaustive, but merely demonstrates the commonly reported factors and includes references for further reading.

Women reporting PLPP during pregnancy were significantly more likely to have had

previous treatment by a doctor for untreated back pain or to have had abdominal pain (Larsen et al, 1999). In addition they were more likely to have reported a history of PLPP in a previous pregnancy and sought advice (To and Wong, 2003; Wellock and Crichton, 2007)(Table 1).

It is apparent that many studies have recorded that women who reported the presence of lower back pain prior to pregnancy were at risk of postpartum PLPP (Table 1). Orlikowski et al (2006) reported that the significant risk factors for PLPP at 6 months postpartum were back pain before pregnancy [odds ratio (OR) 2.67; 95% Confidence Interval (CI) 1.51–4.71] and PLPP at 2 months postpartum [OR 13.07; 95% CI 7.82–21.84]. While To and Wong (2003) reported the significant risk factors for postpartum pain in women at 2 years were lower back pain before pregnancy [OR 4.35; 95% CI 2.05–9.27] and PLPP in a previous pregnancy [OR 5.88; 95% CI 1.64–21.0]. In addition, those with persistent pain at 2 years reported pain starting significantly earlier in the index pregnancy and had worse pain symptoms. Pain intensity was also reported by Mogren (2006) who noted that women who reported increased pain intensity during pregnancy were more likely to have back pain at 6 months postpartum.

Biering et al (2011) found risk factors for persisting PLPP were a pre-pregnancy body mass index (BMI)  $\geq 25$ . Furthermore, Albert et al (2006) reported that women with increased weight pre-pregnancy were more likely to report persistent PLPP, but BMI was not recorded. However, weight was not considered to be a risk factor in two other studies carried out by Butler and Fuller (1998) and Mogren (2006). Turgut et al (1998) reported that younger women were more likely to report PLPP but age was not found to be a risk factor in two other studies (Butler

and Fuller, 1998; Mogren, 2006). Hypermobility (increased laxity around joints) was found to be a risk factor for persisting PLPP by Mogren (2006) but not for PLPP during pregnancy by van Dongen et al (1999), the results of both these studies require interpreting with caution and are not comparable as they employed different classifications of PLPP and methods of assessing hypermobility. It will be important in the future to ascertain if hypermobility and the connective tissue impairments associated with joint hypermobility syndrome/Ehlers-Dalnos Syndrome type III are a risk factor for persisting pain postpartum. PLPP was found to be associated with elective caesarean in a small number of women (Mogren, 2007) and Shepherd (2005) reported the comments of two women who elected to have caesareans because of the severity of their PLPP.

### Perceptions of women

Women reported being disappointed by the care and attention they received by health professionals when consulting about PLPP (Wellock and Crichton, 2007). It was apparent that health professionals did not always understand what PLPP was or the impact it had on women and their families (Shepherd, 2005; Wellock and Crichton, 2007). The lack of understanding among health professionals about PLPP may partly be explained by the fact that it is poorly defined and there is no clear aetiology—as reported earlier in this article.

In addition to the gap in the understanding of PLPP highlighted by Shepherd (2005), Wellock and Crichton (2007) reported that some health professionals were dismissive of the symptoms and not interested in the concerns of pregnant women. It was interesting to note women commenting that their health professional was

**Table 1. Summarising the risk factors for PLPP during and after pregnancy**

Risk factors for PLPP during current pregnancy	Risk factors for postpartum PLPP
Back pain pre-pregnancy requiring the intervention of a health professional (Larsen et al, 1999)	History of back pain pre-pregnancy (Turgut et al, 1998; To and Wong, 2003; Albert et al, 2006; Orlikowski et al, 2006; Gutke et al, 2011; Woolhouse et al, 2012)
Abdominal pain pre-pregnancy (Larsen et al, 1999)	PLPP during pregnancy (Orlikowski et al, 2006; Woolhouse et al, 2006)
History of PLPP in a previous pregnancy (To and Wong, 2003; Wellock and Crichton, 2007)	Increased pain intensity recorded during pregnancy (Turgut et al, 1998; Mogren, 2006)
	Increased pain intensity during delivery (Turgut et al, 1998)
	History of PLPP in a previous pregnancy (To and Wong, 2003; Wellock and Crichton, 2007)

more interested in their other medical needs (i.e. hypertension and rhesus antibodies) than the pain and practical difficulties they were experiencing with PLPP. It was clear from the dialogue in one study that the women had difficulty communicating the severity of their PLPP symptoms and their needs (Wellock and Crichton, 2007). Health professionals may fail to elicit the women's experience of pain, perhaps unknowingly misunderstanding the importance of it, partly due to the fact that pain is commonly reported during and after pregnancy. This has implications for midwives and doctors in relation to pain medication and what would be safe to prescribe in pregnancy.

Shepherd (2005) reported on the fears women experienced in relation to the prognosis and implications that PLPP would have on their labour and delivery. Women reported being frustrated and unable to get health professionals to understand their needs. There was a requirement for women to tell their story, to be taken seriously and not dismissed. They wanted an explanation for their pain; they needed to know that the condition was not going to affect their health or the health

of the unborn child (Wellock and Crichton, 2007). In addition, as PLPP persists into the postpartum period it has been recognised that women require support after pregnancy (Shepherd, 2005; Vleeming et al, 2008). These factors have implications for midwives in terms of education and reassurance.

### Discussion regarding pain associated with PLPP

Midwives have a pivotal role in detecting and advising women who experience PLPP during pregnancy. This is a time when there are distinct changes to a woman's body and it is normal during this time to experience a variety of sensations relating to these changes. PLPP may be one of these sensations, and be mild enough to cause occasional minor discomfort. However, for some women the intensity of the pain perceived becomes more than just a mild discomfort. The severity of the pain experienced is such that it leads to functional impairments including, for example, difficulties with walking and climbing stairs, or getting out of bed or up from a chair. This then impacts on daily activities around the home and at work and affects a woman's general health and wellbeing.

It is apparent in many studies that women reporting pain during pregnancy and postpartum had experienced back pain before pregnancy, indicating the persistent nature of their pain (To and Wong, 2003; Albert et al, 2006; Larsen et al, 2006; Orlikowski et al, 2006; Gutke et al, 2011). Women reporting postpartum PLPP were also more likely to have reported increased pain intensity in pregnancy and during the birth than those not reporting postpartum pain (Turgut et al, 1998; Mogren, 2006).

Other risk factors for PLPP during pregnancy were: pre-pregnancy abdominal pain (Larsen et al, 1999); increased pre-pregnancy BMI (Biering et al, 2011) and multiparity (Turgut et al, 1998; Albert et al, 2006).

When a woman attends antenatal care midwives are best placed to question about PLPP and explore the extent of pain, its impact on function and a woman's general wellbeing. In addition to identifying risk factors that may predispose women to PLPP and postpartum pain, midwives are in a position to help manage this condition, providing they have the knowledge. Midwives may need to advise women to seek the assistance of physiotherapists and/or GPs by referring women for advice, education and pain management of this condition during and after pregnancy.

**Table 2. The five-step approach to recognising and managing PLPP**

Steps	Details
Step one	Assessment of PLPP including actively listening to the woman's pain story: <ul style="list-style-type: none"> <li>● Site of pain</li> <li>● Activity limitations</li> <li>● History of back pain prior to current pregnancy or in a previous pregnancy</li> </ul>
Step two	Explore the woman's concerns in terms of the nature of the pain and give reassurance about the health and wellbeing of the unborn child. The evidence suggests there is little impact on the health and wellbeing of the baby
Step three	Support women to be involved in the management of their symptoms and activity limitations. Provide advice about safe pain relief medication during pregnancy and/or in the postnatal period. Give practical advice about activity, general comfort and when to ask for further advice and support Advice regarding positions for labour (see <i>Table 3</i> )
Step four	Consider referring to a physiotherapist when women are having difficulty managing their symptoms Recognise that some women with severe PLPP may need to seek advice
Step five	Midwives need to be aware that those with PLPP may continue to experience pain postpartum and therefore need to advise women to seek help from other health professionals.

### Implications for midwives

- During antenatal assessment, midwives should ask women about pain in the lower back or pelvic pain region and try to explore if and how this is impacting on their daily living activities and general wellbeing
- They need to understand the risk factors identified in *Table 1* and these should be part of the screening process to identify those women at risk of PLPP
- The stories women tell about their experience of PLPP should be carefully considered in order to offer the most appropriate practical advice and management strategies
- The five-step approach may enable health professionals to recognise and manage PLPP (*Table 2*).

### Managing PLPP during pregnancy

Managing PLPP during pregnancy requires recognition and understanding of the condition so that appropriate management strategies can be implemented. Recognition of PLPP requires health professionals to be aware of features of this condition and to be able to carry out a careful assessment. Understanding PLPP requires an awareness of the underlying pain mechanisms that contribute to persistent/chronic pain states and central sensitisation. This includes educating pregnant women that pain is not always associated with 'damage' or tissue injury (Bjorklund et al, 1999b).

A peripheral pain provoking input is commonly the trigger for central sensitisation (Wolfe, 2012) these triggers may be musculoskeletal and/or visceral (i.e. bowel or uterine) in origin (Chan et al, 2002; Schur et al, 2007; Wilder-Smith and Robert-Yap, 2007). The management of PLPP therefore requires a holistic approach.

Pain provoking triggers may be elicited from the bowel and, as up to 40% of women suffer symptoms of constipation at some stage during their pregnancy (Derbyshire et al, 2007), it is suggested that strategies which target the prevention of constipation—such as fibre in the diet—may contribute to reducing PLPP. For pain provoking triggers that are of uterine in origin it is suggested that strategies that reduce pressure on the cervix may contribute to reducing PLPP (*Table 3*). There are also a number of physical strategies that may be implemented to reduce pain provoking triggers that are musculoskeletal in origin, in particular those emanating from the low back (*Table 3*). Taking regular exercise throughout pregnancy is important (Vleeming et al, 2008) and gentle exercise in water may be beneficial for those with more severe pain. This article has given a brief description of physical strategies to reduce PLPP. For a more comprehensive management plan, midwives and doctors are advised to refer women to physiotherapists who specialise in women's health.

**Table 3. Strategies to manage PLPP during pregnancy and labour**

Positions to reduce lumbar spine extension	Strategies
Sitting	Sit in a well-supported chair with the lower back in a neutral position, this may require flexing the hips and knees, either of both legs, or one leg and placing them on a chair, stool or block. Avoid sitting still for long keep 'wriggling'/altering position
Sitting to standing	Place legs further apart than normal and lean forward with shoulders over thighs before pushing up into standing
Standing	Avoid wearing heels that are too high If standing is required keep 'wriggling'/altering the position of the lower back, if possible put one or other foot up on a step
Lying	Lying on one side: flex hips and knees, and place a pillow between the knees. Rolling over in bed: keep the knees and hips flexed and line up the tummy button with the knees. Semi-recumbent position with a pillow or cushion under the sacrum
Positions to reduce the pressure on the visceral structures	Strategies
Hands and knees	Flex and extend the lower back
Kneeling forwards over a chair	Place a pillow under the knees, lean forward over a chair in a comfortable position. Practise breathing control in this position as this may be a useful position for labour

## Key points

- Pregnancy-related postpartum pain (PLPP) is common, poorly defined, under recognised and not always understood
- Prevalence of postpartum PLPP at 6 months could be as high as 40%
- Risk factors for PLPP during pregnancy are low back pain and/or abdominal pain pre-pregnancy
- Risk factors for postpartum PLPP are low back pain pre-pregnancy and/or PLPP in a current or previous pregnancy

It may be appropriate to take analgesia if the pain continues. Paracetamol is the most appropriate drug of choice as it has demonstrated safety and efficacy at all stages of pregnancy (Rebordosa et al, 2009). A comprehensive overview of the safety and efficacy of analgesics during pregnancy is given by Babb et al (2010). In addition, providing the woman with information and reassurance about her pain can be helpful in reducing anxiety and distress which may exacerbate the pain. Health professionals may encourage women to acknowledge factors that contribute to anxiety and guide women to use approaches to reduce stress.

### Managing PLPP during labour

Women should be encouraged to inform midwives and doctors of their PLPP at the time of their labour. If they have found positions in which they are comfortable and have practised these prior to labour, they should be encouraged to try and use these positions (for example leaning forward over a chair (Table 3)). It is acknowledged that in some cases women elect to have caesareans because of the severity of their PLPP symptoms (Shepherd, 2005).

### Conclusions

It is apparent that PLPP is a common problem in pregnancy and yet poorly defined in the literature and under recognised in antenatal care. For many women the impact appears to be significant affecting their function and quality of life. There is a requirement to meet the expectations of women with PLPP. Women need to be able to tell their story and to have the condition explained. Midwives provide an important component of care and are in an ideal place to ensure the conversation is opened to enable women to tell their story. The persisting nature of postpartum PLPP pain is discussed and the need for this to be recognised. Midwives play a pivotal role in managing PLPP; a five-step management plan is presented as a guide for midwives and doctors.

- Albert HB, Godskesen M, Korsholm L, Westergaard JG (2006) Risk factors in developing pregnancy-related pelvic girdle pain. *Acta Obstetrica et Gynecologica Scandinavica* **85**(5): 539-44
- Allsop JR (1997) Symphysis pubis dysfunction. *British Journal of General Practice* **47**(417): 256
- Babb M, Koren G, Einarson A (2010) Treating pain during pregnancy. *Canadian Family Physician* **56**(1): 25-7
- Biering K, Nøhr EA, Olsen J, Andersen AM, Hjöllund NH, Juhl M (2011) Pregnancy-related pelvic pain is more frequent in women with increased body mass index. *Acta Obstetrica et Gynecologica Scandinavica* **90**(10): 1132-9
- Björklund K, Naessén T, Nordström ML, Bergström S (1999a) Pregnancy-related back and pelvic pain and changes in bone density. *Acta Obstetrica et Gynecologica Scandinavica* **78**(8): 681-5
- Björklund K, Nordström ML, Bergström S (1999b) Sonographic assessment of symphyseal joint distention during pregnancy and post partum with special reference to pelvic pain. *Acta Obstet Gynecol Scand* **78**:125-130
- Briggs EV, Carr ECJ, Whittaker MS (2011) Survey of undergraduate pain curricula for healthcare professionals in the United Kingdom. *European Journal of Pain* **15**(8): 789-95
- Brynhildsen J, Hansson A, Persson A, Hammar M (1998) Follow-up of patients with low back pain during pregnancy. *Obstetrics and Gynecology* **91**(2): 182-6
- Butler R, Fuller J (1998) Back pain following epidural anaesthesia in labour. *Canadian Journal of Anaesthesia* **45**(8): 724-8
- Chan YL, Lam WWM, Lau TK, Metreweli C, Chan DPN (2002) Back pain in pregnancy - Magnetic resonance imaging correlation. *Clinical Radiology* **57**(12): 1109-12
- Derbyshire EJ, Davies J, Detmar P (2007) Changes in bowel function: Pregnancy and the puerperium. *Digestive Diseases and Sciences* **52**(2): 324-8
- Gutke A, Lundberg M, Östgaard HC, Öberg B (2011) Impact of postpartum lumbopelvic pain on disability, pain intensity, health-related quality of life, activity level, kinesiophobia, and depressive symptoms 2011. *European Spine Journal* **20**(3): 440-8
- International Association for the Study of Pain (2011) *Classification of chronic pain*. [www.iasp-pain.org/Content/NavigationMenu/GeneralResourceLinks/PainDefinitions/default.htm](http://www.iasp-pain.org/Content/NavigationMenu/GeneralResourceLinks/PainDefinitions/default.htm) (accessed 28 March 2013)
- Jardri R, Maron M, Delion P, Tomas P (2010) Pain as a confounding factor in postnatal depression screening. *Journal of Psychosomatic Obstetrics and Gynaecology* **31**(4): 252-5
- Kanakaris NK, Roberts CS, Giannoudis PV (2011) Pregnancy-related pelvic girdle pain: an update. *BMC Medicine* **9**:15
- Kehlet H, Jensen TS, Woolf CJ (2006) Persistent postsurgical pain: Risk factors and prevention. *Lancet* **367**(9522): 1618-25
- Larsen EC, Wilken-Jensen C, Hansen H, Jensen DV, Johansen S, Minck H, Wormslev M, Davidsen M, Hansen TM (1999) Symptom-giving pelvic girdle relaxation in pregnancy: Prevalence and risk factors.

- Acta Obstetrica et Gynecologica Scandinavica* **78**(2): 105–10
- Mogren I (2006) BMI, pain and hyper-mobility are determinants of long term outcome for women with low back pain and pelvic pain during pregnancy. *European Spine Journal* **15**(7): 1093–102
- Mogren I (2007) Does caesarean section negatively influence the post-partum prognosis of low back pain or pelvic pain during pregnancy? *European Spine Journal* **16**(1): 115–21
- Mogren I (2008) Physical activity and persistent low back pain and pelvic pain postpartum. *BMC Public Health* **8**(417): 1–5
- Nilsson-Wikmar L, Harms-Ringdahl K, Pilo C, Pahlbäck M (1999) Back pain in women post-partum is not a unitary concept. *Physiotherapy Research International* **4**(3): 201–13
- Nilsson-Wikmar L, Pilo C, Pahlbäck M, Harms-Ringdahl K (2003) Perceived pain and self-estimated activity limitations in women with back pain post-partum. *Physiotherapy Research International* **8**(1): 23–35
- Norén L, Ostgaard S, Nielsen TF, Ostgaard HC (1997) Reduction of sick leave for lumbar back and posterior pelvic pain in pregnancy. *Spine* **22**(18): 2157–60
- Norén L, Ostgaard S, Johansson G, Ostgaard HC (2002) Lumbar back and posterior pelvic pain during pregnancy: A 3-year follow-up. *European Spine Journal* **11**(3): 267–71
- Orlikowski CEP, Dickinson JE, Paech MJ, McDonald SJ, Nathan E (2006) Intrapartum analgesia and its association with post-partum back pain and headache in nulliparous women. *Australian and New Zealand Journal of Obstetrics and Gynaecology* **46**(5): 395–401
- Ostgaard HC, Zetherström G, Roos-Hansson E, Svanberg B (1994) Reduction of back and posterior pelvic pain in pregnancy. *Spine* **19**(8): 894–900
- Rebordosa C, Kogevinas M, Bech BH, Sørensen HT, Olsen J (2009) Use of acetaminophen during pregnancy and risk of adverse pregnancy outcomes. *International Journal of Epidemiology* **38**(3): 706–14
- Schur EA, Afari N, Furberg H, Olate M, Goldberg J, Sullivan PF, Buchwald D (2007) Feeling bad in more ways than one: Comorbidity patterns of medically unexplained and psychiatric conditions. *Journal of General Internal Medicine* **22**(6): 818–21
- Shepherd J (2005) Symphysis Pubis Dysfunction: A hidden cause of morbidity. *British Journal of Midwifery* **13**(5): 301–7
- Stacy J, Frawley H, Powell G, Gaucke R, Pavy T (2012) Persistent pelvic pain: Rising to the challenge. *Australian and New Zealand Journal of Obstetrics and Gynaecology* **52**(6): 502–7
- Sydsjö A, Sydsjö G, Wijma B (1998) Increase in sick leave rates caused by back pain among pregnant Swedish women after amelioration of social benefits. A paradox. *Spine* **23**(18): 1986–90
- Turgut F, Turgut M, Cetinsahin M (1998) A prospective study of persistent back pain after pregnancy. *European Journal of Obstetrics, Gynaecology and Reproductive Biology* **80**(1): 45–8
- To WWK, Wong MWN (2003) Factors associated with back pain symptoms in pregnancy and the persistence of pain 2 years after pregnancy. *Acta Obstetrica et Gynecologica Scandinavica* **82**(12): 1086–91
- Van de Pol G, Van Brummen HJ, Bruinse HW, Heintz PM, Van der Vaart CH (2007) Pregnancy-related pelvic girdle pain in the Netherlands. *Acta Obstetrica et Gynecologica Scandinavica* **86**(4): 416–22
- Van Dongen PWJ, de Boer M, Lemmens WAJG, Theron GB (1999) Hypermobility and peripartum pelvic pain syndrome in pregnant South African women. *European Journal of Obstetrics, Gynecology and Reproductive Biology* **84**(1): 77–82
- Vermani E, Mittal R, Weeks A (2010) Pelvic girdle pain and low back pain in pregnancy: A review. *Pain Practice* **10**(1): 60–71
- Vleeming A, Albert HB, Ostgaard HC, Sturesson, B, Stuge B (2008) European guidelines for the diagnosis and treatment of pelvic girdle pain. *European Spine Journal* **17**(6): 794–819
- Watt-Watson J, McGillion M, Hunter J, Choiniere M, Clark AJ, Dewar A, Johnston C, Lynch M, Morley-Foster P, Moulin D, Thie N, von Baeyer CL, Webber K (2009) A survey of prelicensure pain curricula in health science faculties in Canadian universities. *Pain Research and Management* **14**(6): 439–44
- Way S (2012) A qualitative study exploring women's personal experiences of their perineum after childbirth: Expectations, reality and returning to normality. *Midwifery* **28**(5): e712–9
- Wellok VK, Crichton MA (2007) Symphysis pubis dysfunction: Women's experiences of care. *British Journal of Midwifery* **15**(8) 494–9
- Wilder-Smith CH, Robert-Yap J (2007) Abnormal endogenous pain modulation and somatic and visceral hypersensitivity in female patients with irritable bowel syndrome. *World Journal Gastroenterology* **13**(27): 3699–704
- Woolf CJ (2011) Central sensitisation: Implications for the diagnosis and treatment of pain. *Pain* **152**(3 Supplement): S2–15
- Woolhouse H, Perlen S, Garland D, Brown SJ (2012) Physical health and recovery in the first 18 months postpartum: Does caesarean section reduce long-term morbidity? *Birth* **39**(3): 221–9
- Wu W, Meijer OG, Jutte PC, Uegaki K, Lamoth CJ, De Wolf SG, Van Dieën JH, Wuisman PI, Kwakkel G, De Vries JI, Beek PJ (2002) Gait in patients with pregnancy-related pain in the pelvis: An emphasis on the coordination of transverse pelvic and thoracic rotations. *Clinical Biomechanics* (Bristol, Avon) **17**(9–10): 678–86
- Wu WH, Meijer OG, Uegaki K, Mens JM, van Dieën JH, Wuisman PI, Ostgaard HC (2004) Pregnancy-related pelvic girdle pain (PPP), I: Terminology, clinical presentation, and prevalence. *European Spine Journal* **13**(7): 575–89