

## LITERATURE REVIEW

# Acupuncture and its use in the management of low back and pelvic girdle pain in pregnancy

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### Abstract

This literature review examines four freely available studies that relate to the management of low back and pelvic girdle pain in pregnancy. Two of these publications are case reports, another describes a quasi-randomized trial and the fourth paper is concerned with a single-blind randomized controlled trial. A comparison of the use of acupuncture in these studies is presented. The results of these investigations challenge the traditionally held belief that acupuncture is contraindicated in pregnancy.

*Keywords:* acupuncture, low back pain, pelvic girdle pain, pregnancy.

### Introduction

Low back pain (LBP) and pelvic girdle pain (PGP) are two of the most common complaints in pregnancy (Björklund & Bergström 2000); studies have reported that these problems affect between 48% and 76% of all pregnant women (Fast *et al.* 1987; Berg *et al.* 1988; Östgaard *et al.* 1991; Kristiansson *et al.* 1996). The purpose of the present literature review is to provide an overview of LBP and PGP in pregnancy, and review four freely available articles that describe the use of acupuncture for LBP and/or PGP in pregnancy.

The exact aetiology of LBP and PGP in pregnancy remains unclear. It has been proposed that pain develops as a result of mechanical, complex hormonal or circulatory changes, or a combination of these factors (MacEvelly & Buggy 1996). As the pregnancy progresses, ligaments become lax as a result of complex hormonal changes and the increasing weight of the uterus. The centre of gravity shifts forwards to accommodate the expanding abdomen, the lumbar curve becomes hyperlordotic, the pelvic position alters and the rib angles change. Muscular support is reduced as length-tension relationships alter in the abdominal, pelvic and thoracic regions. Increased blood volume, laxity in blood vessels and the weight of the gravid uterus on the

abdominal great vessels combine to alter blood flow and impede venous return. The weight of the uterus and position of the foetus can also compress lumbosacral nerve roots, and may also contribute to the development of LBP and posterior PGP in pregnancy. Factors that increase the likelihood of developing LBP or PGP in pregnancy include a previous history of these conditions, pelvic asymmetry, smoking and strenuous work (Östgaard *et al.* 1994; Wu *et al.* 2004).

Symptoms usually start between the sixth and ninth month of pregnancy, but can occur as early as the first trimester. These symptoms can worsen as the pregnancy progresses and physical changes become more pronounced. Pain is often aggravated by prolonged weight-bearing, changes in position and activities of daily living. It is often worse in the evening, and may disturb sleep in combination with other factors, such as an increasing frequency of urination (Wu *et al.* 2004).

Low back pain and PGP are often treated as minor and inevitable consequences of the hormonal and mechanical changes that occur during pregnancy; however, the symptoms can lead to significant pain, distress and disability (Perkins *et al.* 1998). Women can become distressed by the likelihood that their pain may worsen throughout the pregnancy, and that this pain may adversely affect labour and the post-natal period. They can also be concerned by the possibility that the pain will return and worsen in subsequent pregnancies.

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The revised guidelines on pregnancy-related PGP published by the Association of Chartered Physiotherapists in Women's Health (ACPWH) advocate that women reporting musculoskeletal symptoms in pregnancy should undergo individual assessment (ACPWH 2007a). The recommended treatment for PGP includes advice regarding positioning and support before and during labour, the possible use of a sacroiliac joint (SIJ) belt, as well as stretches, stabilizing exercises and hydrotherapy, if available. Heat can also be used for pain relief and transcutaneous electrical nerve stimulation may also be used in the third trimester (ACPWH 2007b). The use of heat creams, anti-inflammatory gels, non-steroidal anti-inflammatory drugs and most other medications is limited because of concerns regarding the effect of active ingredients on the developing foetus. Paracetamol is considered to be the safest analgesic, but is only recommended for use if it is taken under medical supervision. Stronger analgesics (e.g. codeine-based preparations) may be prescribed when other measures prove inadequate, but these can cause further complications (e.g. constipation and pelvic discomfort).

Acupuncture has been extensively studied in the management of LBP in the general population and some positive results have been recorded (Furlan *et al.* 2004; Manheimer *et al.* 2005). The underlying mechanisms of acupuncture are rather complex and still not fully understood; however, it is clear that the somatic and autonomic nervous system, neuroendocrine systems, endogenous opioids and central nervous system all play a key role in its effects at the local, regional and central levels (Karavis 1997).

The Western and Eastern approaches to acupuncture vary considerably and a wide range of treatment approaches exist. In simplistic terms, traditional Chinese medicine (TCM) acupuncture involves diagnosis according to patient presentation and history, as well as objective examination, including general observation, tongue, pulse and skin analysis, and palpation (Stux *et al.* 2003). The choice of acupuncture points is dependent on patient presentation, identification of 'pathogens', and consideration of inter-relationships between the acupuncture meridians and organ function. Recognized treatment regimes for particular complaints are often considered within the framework of the individual. Identification and needling of local tender points (Ah Shi points) is also a recognized traditional technique.

In Western healthcare, acupuncture is used by a wide variety of health professionals, and the assessment of patients varies according to the training and medical background of the individual practitioner. The Western use of acupuncture sometimes utilizes TCM approaches; however, practitioners often select traditional acupuncture points within areas of segmental innervation in order to achieve an effect without always considering the TCM meridian or channel theories and inter-relationships. Local needling of muscular trigger points is also relatively common.

It has been reported that acupuncture has been widely used during pregnancy in TCM for many years. A range of problems have been treated in this way, including pain, nausea and vomiting, turning breech babies, induction of labour, and pain relief during labour. Acupuncture has also reportedly been used to stimulate spontaneous pregnancy loss (abortion). As a result of the different effects of discrete acupuncture points, various guidelines exist within the TCM literature relating to 'forbidden points' during pregnancy. Consequently, concerns exist in Western medicine regarding the safety of acupuncture in pregnancy.

There is limited published research assessing the effects of acupuncture on LBP and PGP in the pregnant population. This may partly be because of the research challenge of assessing the effect of any form of therapy in pregnant women because of the risks associated with harming the foetus.

The present literature review examines four freely available studies that relate to the management of LBP and PGP in pregnancy. Two of these publications are case reports, one describes a quasi-randomized trial and the fourth paper is concerned with a single-blind randomized controlled trial (RCT). A comparison of the use of acupuncture in these studies is presented in Table 1.

## Literature review

A case study by Cummings (2003) reported the use of acupuncture in a female subject during two separate episodes of symptoms that occurred one year apart.

The first course of treatment was for LBP and took place when the patient was not pregnant. During this episode, tender sites were needled in the gluteus medius and quadratus lumborum, causing an 85% reduction in symptoms over two sessions.

The second course of acupuncture was for unilateral LBP and leg pain. Treatment was undertaken without knowledge of the pregnancy, which was only discovered six sessions later. It consisted of local periosteal needling to the L5–S1 facet joint, and local tender points in the quadratus lumborum and gluteus medius. Following a discussion about the benefits and risks of treatment between the subject and therapist, the patient opted to continue treatment throughout her pregnancy to the third trimester, when treatment ceased. At this time, the subject started using crutches with a good effect. During the second episode, she was also undertaking chiropractic treatment and exercise, which reportedly aggravated her symptoms.

Cummings (2003) listed a number of adverse events that took place during the sessions, including ‘tattooing’ of the skin as a result of the employment of stainless-steel needles that were found to have a residue on the shaft. The use of these needles was discontinued and the batch was discarded. Other reported adverse events included local pain on needling and the inadvertent needling of the left L5 spinal nerve root during one session, which produced sudden and severe pain referral. The symptoms were only temporary and ceased once the needle was withdrawn. The subject reportedly gave full consent to continue treatment. No adverse events relating to the pregnancy were reported; however, the birth outcomes were unknown.

A single case study by Forrester (2003) described the management of incapacitating LBP in a 21-year-old female from 24 weeks’ gestation until the end of the pregnancy. The initial treatment focused on LBP; however, as this resolved, therapy was focused on leg pain and cramps. A positive outcome was reported, and no treatment was given beyond 33 weeks gestation until a review that took place 3 weeks postnatally.

Treatment started at 24 weeks’ gestation. It was provided on a weekly basis to 29 weeks, then at 31 and 34 weeks, and finally, at 3 and 9 weeks postnatally. The treatment involved using manual acupuncture bilaterally to traditional points for LBP or points connected via segmental innervation, including Bladder (BL) 23, BL25 and BL57, and Huatuoji (HTJ) points at the L2 and L4 levels. Outcome was measured according to patient-reported pain symptoms and a Visual Analogue Scale (VAS; range=0–100). No adverse effects were reportedly experienced by the woman or her infant.

Guerreiro da Silva *et al.* (2004) undertook a prospective quasi-randomized controlled study. This study recruited females with LBP or PGP who were attending the hospital antenatal programme. Out of a group of 79 women, 61 (77.2%) reported at least mild LBP or PGP. These subjects were allocated to either ‘conventional’ management (the control group) or ‘conventional’ management plus acupuncture (the treatment group). ‘Conventional’ treatment consisted of prescribing analgesic medication (500 mg paracetamol) and anti-spasmodic medication (10 mg hyoscine). The treatment group also received acupuncture, which involved the use of eight standard acupuncture points as well as the option of four additional points to individualize the treatment to each patient’s presentation. Commonly used points included Kidney (KI) 3, Small Intestine (SI) 3, BL62, BL40, Triple Energizer (TE) 5, Gall Bladder (GB) 30, GB41 and HTJ points over between eight and 12 treatments on a once- or twice-weekly basis.

Women attending a Monday–Wednesday class were allocated to the control group, whereas those attending a Tuesday–Thursday class were allocated to the treatment group. Prospective subjects were excluded if they had experienced any chronic or handicapping LBP before becoming pregnant, if they were in a high-risk pregnancy group, or if they had been treated with acupuncture in the preceding year.

Guerreiro da Silva *et al.* (2004) measured outcomes including pain levels (score=0–10), the use of medication and self-reported functional capacity for three areas of function (score=0–10). Statistically significant reductions were reported in the acupuncture group with respect to pain and the use of paracetamol ( $P=0.0005$ ). Statistically significant improvements were also reported in this group with respect to functional capacity ( $P=0.01$ ). Birth weights and Apgar scores were similar between the two groups. No adverse effects were reported in either the subjects or their infants.

Elden *et al.* (2005) reported an extensive single-blind RCT in which 386 pregnant women with isolated PGP were randomly assigned to either standard treatment (education, advice and sacroiliac belt), acupuncture (including standard treatment) or stabilization exercises (including standard treatment with some individual massage and stretching). Prospective subjects were excluded if they had another pain condition, systemic disorders, multiple pregnancy or contraindications to treatment.

**Table 1.** Summary of four studies of the use of acupuncture in pregnancy: (SIJ) sacroiliac joint; (N/A) not applicable; (LBP) low back pain; (PGP) pelvic girdle pain; (BL) Bladder; (HTJ) Huatuojiagi; (KI) Kidney; (SI) Small Intestine; (TE) Triple Energizer; (GB) Gall Bladder; (GV) Governor Vessel; (LI) Large Intestine; (SP) Spleen; (ST) Stomach; (EX) Extra Point; (VAS) Visual Analogue Scale; and (NRS) Numeric Rating Scale

| Variable                                      | Study  |  |  | Elden <i>et al.</i> (2005)   |
|---|--|--|--|--|
|   | Cummings (2003)  | Forrester (2003)   | Guerreiro da Silva <i>et al.</i> (2004)  |  |
| Participants ( <i>n</i> )                     | 1  | 1  | 34 (medication only)<br>27 (medication and acupuncture)                                  | 130 (advice, education and SIJ belt)<br>125 (acupuncture, advice and education)<br>131 (stabilizing exercises, advice and education, massage and stretching) |
| Power of study                                | N/A  | N/A  | Not indicated  | 103 for each group for 90% power to detect a difference (at the two-sided 5% level)  |
| Age range (years)                             | 32   | 21   | 15–39  | Average age 30–31 years in all groups  |
| Area of symptoms                              | LBP, buttock and leg pain  | LBP, followed by leg pain and then calf cramps   | LBP or PGP   | Isolated PGP   |
| Gestational time at initial treatment (weeks) | First six sessions in the first trimester: pregnancy reported at the seventh session; number of weeks not stated | 24   | 15–30  | 12–31  |
| Treatment frequency                           | Weekly to fortnightly  | Once weekly for five sessions; 2 weeks later; 3 weeks later; 11 weeks later (3 weeks postnatally); 3 weeks later (9 weeks postnatally) | Once weekly; twice weekly for severe pain  | Twice-weekly acupuncture; once-weekly individual exercise with massage and/or stretches  |
| Acupuncture treatment time (min)              | –  | 1, 5, 10, 15 and 20 min maximum from the fifth visit onwards   | 25   | 30 (acupuncture)<br>60 (exercise, massage and stretches)   |
| Stimulation                                   | –  | Electroacupuncture at one stage, otherwise not stated  | Not specified if any stimulation used, but stated attempt made to elicit De Qi at points | Manual stimulation every 10 min; obtaining De Qi   |
| Treatments ( <i>n</i> )                       | 18   | 9  | 8–12   | 12 (acupuncture)<br>6 (exercise)<br>1 (advice)   |

*Continued /*

Table 1. Continued

| Variable                    | Study           | Forrester (2003)  | Guerreiro da Silva <i>et al.</i> (2004)  | Elden <i>et al.</i> (2005)  |
|-----------------------------|-----------------|---|--|---|
| Average points ( <i>n</i> ) | Cummings (2003) | 2, 4, 6 or 10   | 12 (8 standard points with ≤4 additional points)   | Local individual selection according to diagnostic palpation: 10 segmental points and 7 extra-segmental points used   |
| Most commonly used points   | Cummings (2003) | Bilateral points: BL23, BL25, BL57; HTJ points at similar levels; L2, L4  | KI13, SI3; BL62, BL40; TE5, GB30, GB4; HTJ points  | GV20; bilateral points: LI4, BL26, BL32, BL54, BL60; KI11, GB30, SP12, ST36, EX21   |
| Outcome measures            | Cummings (2003) | Patient symptom reporting and general reassessment  | Pain score: NRS (0–10); use of medications; functional capacity (0–10) for general activities, walking and working; birth weights and Apgar scores   | Pain score: VAS (0–100) every afternoon and evening; physical reassessment  |
| Results                     | Cummings (2003) | No statistical analysis of change; treatment stopped at around 27–29 weeks of pregnancy when the patient decided that she was comfortable enough to continue without treatment with the aid of crutches | Statistically significant reduction in acupuncture group's pain levels ( $P < 0.0001$ ); reduced use of paracetamol ( $P = 0.005$ ); improved functional capacity ( $P = 0.01$ general activities; $P < 0.001$ work and walking); no difference in infant measures | Reduction in reported pain in acupuncture group compared to education/SIJ belt group ( $P < 0.001$ ); reduction in pain in exercise group compared to education/SIJ belt group ( $P < 0.04$ ); no statistical difference between acupuncture and exercise groups; reduction in pain most pronounced in the evening in acupuncture group at review one week after end of treatment |
| Significant adverse effects | Nil             | Nil   | Nil in females and infants   | Nil in females and infants  |

Acupuncture treatment was determined according to points of local sensitivity. Ten segmental and seven extrasegmental points were used. Commonly used points included Governor Vessel (GV) 20, bilateral Large Intestine (LI) 4, BL26, BL32, BL54, BL60, KI11, GB30, Spleen (SP) 12, Stomach (ST) 36 and Extra Point 21. The outcome measures included reported pain scores (VAS=0–100) and physical reassessment by an independent examiner. The reported results included a statistically significant reduction in pain for both the acupuncture and exercise groups compared to the standard treatment group, but no statistical difference between the acupuncture and exercise groups, although the acupuncture group showed more positive outcomes. No adverse effects were reported in either the subjects or their infants.

## Discussion

One major criticism regarding research in a clinical population relates to the use of small sample sizes, which results in a lack of statistical power to detect change. With regard to the present literature review, the single case reports had major limitations; however, these studies reported the use of different forms of acupuncture application and contribute to a growing body of evidence describing the safe application of acupuncture in pregnancy. Guerreiro da Silva *et al.* (2004) used a relatively small sample size, but took the importance of power into consideration in their study; they were still able to detect statistically significant changes between the treatment groups. Elden *et al.* (2005) also considered statistical power and ensured that their sample sizes were appropriate to achieve a 90% power for detecting a significant change.

All four studies varied widely in terms of frequency of treatment, the time for which the treatment was provided and the acupuncture technique used. Not all of the authors considered TCM principles in the selection of points. All four reports initially administered treatment on a weekly or fortnightly basis, but the times given for treatment varied significantly. All sessions lasted no longer than 30 min.

Current theories in acupuncture suggest that treatment times of under 20 min predominantly affect local tissue and spinal cord mechanisms, whereas longer sessions begin to augment the central nervous system and neuroendocrine system. However, since there are so many physiological changes during pregnancy, it is

unclear whether this results in different levels of sensitivity and different responses to the various systems. This is evidently an area that requires further research.

Notably, all the acupuncture treatments reported in the four studies involved more than six sessions. Current research suggests that a minimum of six treatments is required to achieve a positive result in treating chronic pain. To date, the number of sessions, and the time required for treating acute episodes of pain and other conditions (e.g. pregnancy) has not been studied or documented thoroughly.

Interestingly, although Cummings (2003) administered the greatest number of treatments during pregnancy, the efficacy of the acupuncture treatment is questionable because the subject was also undertaking other forms of therapy (e.g. chiropractic manipulation and exercises). Furthermore, the use of crutches from 25 weeks' gestation significantly reduced symptoms and acupuncture treatment was stopped. However, the inclusion of Cummings' (2003) case report in the present literature review is not intended to provide a comparison with the most effective treatment methods, but is meant to recognize that acupuncture during pregnancy does not result in any known adverse effects, and to document the points and techniques used.

Three out of the four articles described in the present literature review indicate that treatment was begun in the second trimester; however, no specific reasoning for this decision is discussed in any of these articles. Cummings (2003) inadvertently treated a subject with acupuncture during her pregnancy, although it was not known at the time. Forrester (2003) acknowledged that it is usual practice to commence treatment once a healthy pregnancy has been established and the first trimester is complete. He cited that 15% of known pregnancies result in spontaneous miscarriage in the first trimester, and highlighted that, because of concerns with litigation, clinicians are wary of initiating a treatment during the first trimester since it could be blamed for any subsequent miscarriage. However, treatment is sometimes commenced with the subject's full informed consent if the benefits of the treatment outweigh the risks involved.

There was also significant variation in the treatment approach and amount of stimulation reported in the four papers. This probably reflects the wide range of schools of acupuncture training and the variety of techniques utilized in the clinical environment. Cummings (2003)

adopted a dry needling/intramuscular and periosteal needling approach, and also tried some electroacupuncture, but he considered it less effective for this particular patient and returned to vigorous manual acupuncture. However, details of the techniques and progression at each session are scant.

By comparison, Forrester (2003), Guerreiro da Silva *et al.* (2004) and Elden *et al.* (2005) selected traditional acupuncture points, and some intended to elicit De Qi. Ah Shi (tender) points were also used. Forrester (2003) clearly documented that point selection had been based on traditional acupuncture principles and concepts of segmental innervation, and considered the concept of 'forbidden points' in pregnancy. He mainly used a small selection of Bladder (BL23, BL25 and BL57) and corresponding HTJ points at the L2 and L4 levels. While these points are commonly used in the general LBP population, the TCM literature and the AACP Foundation Acupuncture Course guidelines (Pearce 2007) suggest that points over the lumbosacral area should not be used during pregnancy because of shared segmental innervation with the uterus, cervix and pelvis.

Guerreiro da Silva *et al.* (2004) did not provide clear reasoning for the points that they selected and did not document all the points that were used. These authors indicated that the commonly used points were KI3, SI3, BL62, BL40, TE5, GB30, GB41 and HTJ points along the spine. Elden *et al.* (2005) selected points according to local sensitivity following diagnostic palpation and indicated that they were trying to access the segmental inhibition systems to provide pain relief.

A number of 'forbidden points' in pregnancy are well documented in the literature (Dale 1997). These points are largely based on a wealth of historical and authoritative literature, and vary depending on which text is consulted; however, there is currently little research evidence for these directives. The 'forbidden points' include those over the abdomen, those with a strong effect on the autonomic nervous system, those with shared segmental innervation with the uterus and cervix, and points that have reportedly been used to terminate pregnancies. Another example of TCM reasoning is the avoidance of the yin channels in the lower limbs. Some points are considered completely contraindicated, whilst others are considered appropriate for moxibustion only. Certain points are contraindicated until the pregnancy reaches a

specific milestone (e.g. 33 weeks for points used to turn a breech presentation and 36 weeks for points associated with the induction of labour). The AACP Foundation Acupuncture Course guidelines (Pearce 2007) recommend that LI4, Lung 11, Liver (LV) 1, LV3, KI11, SP6, BL60, BL67, GV22 and GB21 are specifically avoided during pregnancy, in addition to normal TCM 'forbidden points'.

Notably, Elden *et al.* (2005) used LI4 and BL60, which are considered to be contraindicated during pregnancy in TCM and AACP Foundation Acupuncture Course literature (Pearce 2007). These authors also used BL32 and ST36, which are also points described by some traditional sources as being 'forbidden' during pregnancy (Becke 1988, cited in Forrester 2003; Lian *et al.* 2005).

Large Intestine 4 is contraindicated during pregnancy because strong manipulations have been reported to cause uterine contractions, although this point is used for analgesia in labour (Stux *et al.* 2003; Lian *et al.* 2005). Additionally, BL60 is contraindicated until a pregnancy is full term since it is also used in TCM to induce or increase contractions during labour (Lian *et al.* 2005).

Out of the four studies, only Forrester (2003) reported reviewing TCM literature relating to 'forbidden points' in pregnancy (Table 2). Cummings (2003) alluded to concerns associated with spontaneous pregnancy loss and other complications of pregnancy that could be attributed to acupuncture treatment, but he did not specifically address the issue of 'forbidden points' in pregnancy in the paper. It is surprising that these points were not given due consideration in light of the paucity of quality research documenting the safe use of acupuncture during pregnancy for LBP and PGP, and the risks associated with trialling treatments on a pregnant population.

Notably, although Pericardium 6 is listed as contraindicated in Table 2, this point has been extensively studied in the management of nausea and vomiting associated with pregnancy, and is now considered to be safe and effective to use. Other points listed above have also been used in various studies without adverse effects being reported.

Interestingly, some other authors have reported needling a number of 'forbidden points' judiciously without observing any adverse effects to the mother or unborn foetus (Becke 1988, as cited in Forrester 2003). Consequently, questions are now arising relating to whether points are

**Table 2.** Forbidden points in pregnancy (cited by Forrester 2003): (CV) Conception Vessel; (PC) Pericardium; (GB) Gall Bladder; (GV) Governor Vessel; (HTJ) Huatuojiayi; (KI) Kidney; (LI) Large Intestine; (LU) Lung; (LV) Liver; (SI) Small Intestine; (SP) Spleen; (ST) Stomach; (TE) Triple Energizer; (BL) Bladder; (T) Thoracic; (L) Lumbar; and (S) Sacral

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Acupuncture points

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CV2, CV3, CV4, CV5, CV6, CV7

PC6, PC8

GB2, GB9, GB21, GB34

GV3, GV4, GV5, GV6, GV7

All HTJ points

KI1, KI2, KI4, KI7

LI2, LI4, LI10

LU7, LU11

LV1

SI7, SI10

SP1, SP2, SP6, SP13, SP14

ST4, ST12, ST24, ST25, ST36, ST45

TE4, TE10

BL60, BL67

Points with shared segmental innervation to the uterus and cervix, i.e.:

T11, T12

L1, L2

S2, S3, S4

All leg and hand points, and low back, loin and abdominal points, especially:

LI4,

GB3, GB21, GB31

ST25, ST30, ST36, ST44

SP6

KI3, KI6

GV20

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completely or only relatively contraindicated (i.e. appropriate for gentle manipulation only) and further research is required in this area. In the four studies reviewed in the present paper, no adverse effects were reported relating to the women or their infants.

### Other issues

There are a number of difficulties associated with research into acupuncture. First, acupuncture is still considered to be a 'novel' treatment in Western medicine, and in itself, this can create a significant treatment effect regardless of the points used, the method of stimulation or the other treatment parameters that are selected. Consequently, studies that do not include a sham acupuncture group are often criticized and any significant results are dismissed as placebo effects. However, it is very difficult for researchers to deceive patients into believing that they have undergone an acupuncture treatment that penetrates the skin at specified sites when they have not. Additionally, even a gentle touch

has a physiological effect. Furthermore, it is also ethically difficult to justify providing a sham or control treatment to symptomatic pregnant women that does not have a clinical effect when it is well documented that there are treatments that are effective in the management of PGP and LBP in pregnancy, and it is known that high levels of stress raise cortisol, which can cross the maternal-placental interface and affect the foetus' developing nervous system with potentially long-term consequences. As acupuncture becomes more widely known, it is also difficult to find a group of patients who are naïve about it.

Some of the control 'treatments' described in the articles reviewed in the present study were questionable. Guerreiro da Silva *et al.* (2005) used paracetamol and hyoscine as the control treatment; however, these authors did not provide evidence-based justification of this regimen as an effective treatment for LBP and PGP in pregnancy. Furthermore, some patients included in their groups may have been averse to taking medications during pregnancy because of perceived risks. However, Guerreiro da Silva *et al.* (2005) highlighted the ethical issue regarding the need to provide treatment for patients in a real-life situation, and justified their approach by explaining that both groups were offered medication as standard treatment and acupuncture was added to the standard treatment in the treatment group.

Elden *et al.* (2005) attempted to compare the effect of recognized treatments used in the clinical setting; however, the treatments in these groups were not completely standardized. These authors briefly documented that some patients in the exercise group also received stretching and massage, which confounds the results, but this more accurately reflects the kind of multi-treatment approach commonly used in clinical settings. In this group, Elden *et al.* (2005) highlighted that the manual treatment was only undertaken once weekly, whereas the main treatment (exercises) was performed at least daily. Surprisingly, although these authors stated that previous research highlighted that their standard treatment including education and a SIJ belt is ineffective, they opted to use this approach in the control group. Elden *et al.* (2005) also concluded that this was not an effective form of treatment in the pregnancy population.

In the two case studies, both women were in their first pregnancy. Elden *et al.* (2005) studied women who were in different pregnancies (just over one-third in each group were in their first



pregnancy); however, Guerreiro da Silva *et al.* (2004) did not indicate whether women were in their first or a subsequent pregnancy. Since mechanical and hormonal influences are enhanced with each subsequent pregnancy, these factors may potentially also confound results. This was not highlighted in the above authors' discussion.

Overall, Cummings (2003) presented a rather narrow discussion of the mechanics of applying periosteal needling in pregnancy, briefly highlighting that no adverse effects occurred, even though treatment had been unwittingly commenced during the first trimester. In contrast, Forrester (2003) provided an extensive and well-researched summary relating to safety risks, 'forbidden points', litigation and the evidence for the number of treatment sessions, and highlighted relative contraindications to acupuncture in pregnancy. Forrester (2003) also discussed potential direct and indirect mechanisms (e.g. segmental, hormonal and autonomic system changes) during pregnancy. Guerreiro da Silva *et al.* (2004) highlighted the limitations of not using sham acupuncture, but discussed the ethical need to be providing some form of recognized treatment in a clinical population with a real-life need. There was only minimal discussion of the mechanisms of the treatment effects; Guerreiro da Silva *et al.* (2004) focused on the results of their study demonstrating that no adverse effects occurred as a consequence of acupuncture in pregnancy. Elden *et al.* (2005) provided a brief discussion regarding the effects of stabilizing exercise, the absence of evidence for 'standard' treatment, and the acupuncture mechanisms and concepts of segmental pain inhibition and the activation of central pain systems via endogenous opioid activation.

## Conclusions

The results of the four papers discussed in the present literature review challenge the traditionally held belief that acupuncture is contraindicated during pregnancy, and warrant further review of other publications on the safety and effectiveness of acupuncture for LBP and/or PGP during pregnancy. Furthermore, it is apparent that additional research into the use of acupuncture in the management of PGP and LBP during pregnancy needs to be undertaken to establish specific parameters for stimulation, and the length and progression of treatment. Furthermore, since LBP and PGP are two dif-

ferent presentations that require different treatment approaches from an exercise and manual treatment perspective, it may be clinically useful if studies separate the two presentations into different treatment groups to elucidate whether a different approach is required from an acupuncture standpoint. It may also be useful if groups of pregnant women are separated into first, second or subsequent pregnancies since the hormonal and mechanical responses to pregnancy increase with each subsequent pregnancy, and inclusion of a range of women in different pregnancies may confound results. In addition, studies require significant numbers and researchers must consider the statistical power of the sample size. Studies preferably should be RCTs; however, case studies continue to increase the body of literature documenting the safe use of acupuncture in pregnancy.

While the results of these particular studies cannot be extrapolated to the general population of pregnant women in the clinical setting, the papers reviewed contribute to the growing body of literature suggesting that acupuncture can be safely administered during pregnancy given adequate training and knowledge of its use. Although some aspects of the study methodology and discussions can be criticized, these investigations challenge the historical belief that some points are absolutely contraindicated during pregnancy and a review of further literature is warranted. Indeed, the studies' findings are further supported by a recent extensive Cochrane review of RCTs relating to interventions for preventing and treating back pain in pregnancy. This Cochrane review concluded that, although further quality research was required, the indications were that acupuncture was useful in the management of PGP and LBP in pregnancy (Pennick & Young 2007).

## Update

Since this article was first written, it has been possible to review three additional studies and one systematic review relating to the use of acupuncture for the treatment of PGP or LBP during pregnancy.

Wedenberg *et al.* (2000) conducted a prospective randomized study that compared acupuncture with physiotherapy for LBP and PGP in pregnancy. Thirty women were included in each group; however, only 18 women in the physiotherapy group completed the trial. In this study, acupuncture involved auricular acupuncture

with or without body acupuncture, and therefore, the design was very different from that of the other research discussed in the present literature review. Commonly used body acupuncture points included BL26–30 and BL60. Physiotherapy was individualized according to assessment findings and included education regarding the condition. Women were also treated with any combination of treatment methods, including pelvic belts, heat treatment, massage, soft-tissue releases and twice-weekly hydrotherapy, resulting in a lack of standardization. Although statistically significant reductions in morning and evening pain were reported in the acupuncture group ( $P=0.02$  and  $P<0.01$ , respectively), one major limitation of Wedenberg *et al.*'s (2000) study was the small number of women in the physiotherapy treatment group.

Ternov *et al.* (2001) retrospectively reviewed the adverse and analgesic affects of acupuncture during the second and third trimesters of pregnancy in 167 consecutive patients with LBP, PGP or both. In this observational study, the LV3 and LI4 points were manually stimulated, along with local tender points. Although Ternov *et al.* (2001) described no significant adverse effects on the pregnant woman or delivery of the baby, they did note a high level of transient adverse effects such as dizziness or tiredness in 35 patients (21%), but these authors also stated that the analgesic effects reported by the midwives involved were good or excellent in 72% of cases. However, Ternov *et al.* (2001) did not document what the 'written instructions' for treatment involved, what constituted 'good' or 'excellent' analgesia, or what treatment protocols were used for acupuncture, once again referring only to 'written instructions'. The high level of transient adverse effects may reflect the style of reporting or the interpretation of the notes. However, the level of expertise and training of the 17 midwives involved in the treatment was not documented either, and the results may be confounded by a lack of consistency or experience in the practitioners providing the treatment. Nevertheless, although this was a retrospective observational study, it involved a reasonable number of subjects and increases the body of evidence regarding the safety of acupuncture during pregnancy.

Kvorning *et al.* (2004) conducted an RCT involving 72 women with PGP or LBP in the last trimester of pregnancy: 37 received acupuncture and 35 did not receive any intervention. Treatment was given according to the individual's

pain patterns and the aim was to achieve De Qi by using traditional acupuncture points in addition to local points. Commonly used points included LV3 and BL60, as well as BL22–26, GV20 and SI3. During the study period, VAS scores for pain intensity reduced by 60% in the acupuncture group compared with 14% in the control group ( $P<0.01$ ). In addition, 43% of the women in the acupuncture group were less bothered by their pain at the end of treatment compared to 9% in the control group ( $P<0.01$ ). No significant adverse effects to either the women or their infants were reported by Kvorning *et al.* (2004).

Overall, these studies are plagued by poor research methodology (including a lack of placebo treatment), high drop-out rates in the control groups, a lack of randomization or blinding to treatment method, and a deficiency of information regarding treatment methodologies. Ee *et al.* (2008) published a systematic review of acupuncture for PGP and LBP in pregnancy. Because of the rigorous inclusion criteria relating to RCTs, their paper only reports on the studies by Wedenberg *et al.* (2000), Kvorning *et al.* (2004) and Elden *et al.* (2005). Ee *et al.* (2008) also commented on the lack of good-quality studies in this area, the lack of placebo acupuncture in each of these three studies and the difficulty with research methodology blinding the treatment practitioner to the type of treatment being administered. However, they also concluded that limited evidence exists that acupuncture is safe and more effective than standard treatment alone in the treatment of PGP and LBP during pregnancy.

## Acknowledgements

I would like to thank Lynn Pearce, my tutor on the Foundation Course in Acupuncture that I attended at Westminster Primary Care Trust, London, UK, in October–November 2007. I would also like to thank all the pregnant and postnatal women who have seen me over the years for treatment who continue to enhance my understanding of pregnancy and the postnatal phase.

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