Journal of the Association of Chartered Physiotherapists in Women's Health, Autumn 2014, **115,** 5–13

LITERATURE REVIEW

Should all women with pregnancy-related pelvic girdle pain be treated with exercise?

R. Bromley
Physiotherapy Department, Nuffield Health Shrewsbury Hospital, Shrewsbury, Shropshire, UK

P. Bagley
School of Health Studies, University of Bradford, Bradford, UK

Abstract
This paper presents the main findings of a systematic literature review that was undertaken to investigate whether physiotherapist-guided exercise is effective in reducing the severity of pregnancy-related pelvic girdle pain (PPGP). Seven electronic databases were systematically searched. Studies that met the inclusion criteria were assessed for methodological quality and internal validity. Five primary randomized controlled trials (RCTs) and one post-partum follow-up study were included in the review. The authors of all six studies incorporated advice and physiotherapist-guided exercise, either in a group setting or as part of an individualized exercise programme, into at least one of their intervention groups, with or without the addition of a pelvic support belt, acupuncture or other physiotherapy treatment modality. Two of the primary RCTs found that exercise and advice effectively reduced pre-partum PPGP. One study concluded that exercise had no additional value beyond simply supplying a pelvic support belt and advice. The results of another trial supported the use of physiotherapist-guided stabilization exercises for the treatment of post-partum PPGP. Yet another study did not find any differences between the intervention groups involved. The works included in this review all reported that PPGP reduced over time, regardless of the intervention used to treat it, suggesting that the greatest factor influencing the resolution of PPGP is time rather than exercise. The findings do not support the routine use of physiotherapist-guided exercise in the treatment of all women with PPGP. Advice, information and a non-elastic pelvic support belt should be offered to women with pre-partum PPGP, whereas patients with persistent symptoms of post-partum PPGP should receive individualized physiotherapist-guided exercise aimed at stabilizing the pelvic area as part of a wider package of physiotherapy treatment.

Keywords: exercise, pelvic girdle pain, pregnancy.

Introduction
Pregnancy-related pelvic girdle pain (PPGP) encompasses pain in the lumbosacral, sacroiliac and symphysis pubis joints (ACPWH 2007), and is thought to affect approximately 20% of pregnant women (Vleeming *et al*. 2008). It can be experienced in all three joints simultaneously, a condition known as pelvic girdle syndrome, or localized to the symphysis pubis (previously called symphysis pubis dysfunction) or the sacroiliac joints (either unilateral or bilateral) (Albert *et al*. 2002; Robinson *et al*. 2006). Symptoms usually start around the eighteenth week of pregnancy, but can also begin in the first trimester or as late as 3 weeks after delivery (Wu *et al*. 2004). Pregnancy-related pelvic girdle pain may have a significant impact on quality of life and the ability to perform normal activities of daily living.

There is evidence to suggest that a past history of low back pain, previous trauma to the pelvis,

Correspondence: Rachel Bromley, Physiotherapy Department, Nuffield Health Shrewsbury Hospital, Longden Road, Shrewsbury, Shropshire SY3 9DP, UK (e-mail: rebromleyphysio@btinternet.com).

Table 1. Summary of the inclusion and exclusion criteria

Variable	Inclusion criteria	Exclusion criteria
Population	Female Diagnosis of pregnancy-related pelvic girdle pain (including pregnancy-related pain in the lumbosacral region, sacroiliac joints and symphysis pubis)	Previous history of spinal fracture, inflammatory disease, spinal surgery or spinal pathology
Intervention	Physiotherapist-guided exercise, including: • core stability exercises • pelvic floor muscle exercises • hydrotherapy • general exercise	Other physiotherapy modalities; for example: • electrotherapy • mobilizations • massage Exercise guided or supervised by someone other than a physiotherapist
Comparator	Not included	Not included
Outcome measure	Pain	Study does not include pain intensity as a primary outcome measure
Study design	Randomized controlled trial Study published after 2000 Study published in English	Non-randomized trial Quasi-randomized trial

PPGP in earlier pregnancies, multiparity, heavy manual work and a high body mass index can all increase a woman's risk of developing PPGP (Vleeming *et al*. 2008; Vermani *et al*. 2010; Kanakaris *et al*. 2011). The exact cause of the condition is unclear, but it is thought that a combination of biomechanical and hormonal changes compromise the stability of the pelvic girdle (Vleeming *et al*. 2008; Langshaw 2011). During pregnancy, a woman's centre of gravity shifts forward to accommodate the increased weight of the gravid uterus and the expanding abdomen. As the position of the lumbar spine and pelvis alters, muscular support is reduced as a result of changes in the relationship between muscular length and tension in the pelvic, abdominal and thoracic regions (Langshaw 2011).

Because of the diversity of published studies of PPGP, there is no strong comparative evidence regarding the most effective treatment for patients with the condition (Kanakaris *et al*. 2011). The Association of Chartered Physiotherapists in Women's Health (ACPWH 2007) recommend a multidisciplinary and collaborative management approach, which may include referral to a physiotherapist for advice, manual therapy, exercise, acupuncture, or provision of aids such as a pelvic support belt or elbow crutches (Stuge *et al*. 2003; ACPWH 2007; Vermani *et al*. 2010). As yet, there is no strong evidence to indicate which physiotherapy intervention is the most effective in alleviating PPGP.

The primary aim of the present review was to determine whether physiotherapist-guided exercise is effective in reducing the severity of PPGP. The main results of the systematic literature review are described, and suggestions are made regarding how these findings might influence current physiotherapy management of this common and often debilitating condition.

Materials and methods

The review process employed a systematic methodology. However, because of academic requirements, only the main author (R.B.) interpreted the data and drew conclusions about the studies that were included. This may have resulted in an element of bias within the review, although steps were taken throughout to ensure that the review process remained transparent and rigorous.

Studies were required to meet certain standards in order to be included in the review. These criteria are detailed in Table 1. Seven electronic databases were systematically searched for studies of pregnant, perinatal and postnatal women (up to one year after giving birth) who had been diagnosed with PPGP and treated with physiotherapist-guided exercise. The databases used were:

- the Allied and Complementary Medicine Database (AMED);
- the Centre for Reviews and Dissemination (CRD) databases;
- the Cumulative Index to Nursing and Allied Health Literature (CINAHL);
- the Cochrane Library databases;
- the Medical Literature Analysis and Retrieval System Online (MEDLINE);
- the Physiotherapy Evidence Database (PEDro); and

- the System for Information on Grey Literature in Europe (SIGLE).

The following search terms were used: *Population:* ''low back pain'', ''lumbar spine'', ''natal'' (antenatal, prenatal, perinatal, postnatal), ''pain'', ''partum'' (ante-partum, pre-partum, post-partum), ''pelvic girdle pain'', ''pelvic girdle syndrome'', ''pregnancy'', ''pregnant'', ''sacroiliac joint pain'' and ''symphysis pubis dysfunction''; and *Intervention:* ''abdominal muscles'', ''core stability'', ''exercise'', ''Kegel'', ''pelvic floor muscles'', ''physical therapy'', ''physical therapist'', ''physiotherapist'', ''stabilization'', ''therapy'' and ''transversus abdominis''. Limiting a search to randomized controlled trials (RCTs) helps to reduce bias within a review (CRD 2008), although it is possible that ethical considerations regarding the use of RCTs on pregnant women may have limited the number of available papers.

Studies that met all of the inclusion criteria were assessed for methodological quality using the PEDro scale (PEDro 2014). This instrument was developed to rate the quality of RCTs that evaluate physiotherapy interventions (Maher *et al*. 2003). The PEDro scale gives an indication of the methodological quality of a piece of research in terms of its external validity (''generalizability''), internal validity and statistical interpretation. Information regarding the generalizability of a study indicates how closely it reflects ''routine practice'' (CRD 2008), which is an important factor when determining whether the results could be used to inform clinical practice in the wider community.

Because of the diversity of the papers included with regard to study population, interventions and outcome measures, it was not possible to perform a statistical analysis of the reported findings. Instead, a narrative synthesis approach was used in order to give a descriptive and structured summary of the results (Popay *et al*. 2006).

Results

Flow of studies through the review

The search strategy yielded 102 potentially relevant studies. Selection on the basis of titles and abstracts excluded 88 studies, and the full texts of 14 articles were reviewed. Eight of these 14 studies failed to meet all the inclusion criteria, and therefore, were not included in the present systematic review (see Fig. 1).

Study characteristics

The six studies that met the inclusion criteria were deemed to be of sufficient quality and rigour to be included in the final review (see Table 2). Five of these studies were primary RCTs (Stuge *et al*. 2004; Depledge *et al*. 2005; Elden *et al*. 2005; Nilsson-Wikmar *et al*. 2005; Haugland *et al*. 2006), and one (Elden *et al*. 2008) was a post-partum follow-up of the original trial by Elden *et al*. (2005). Four of the primary RCTs focused on treatment for PPGP during the pre-partum period (Depledge *et al*. 2005; Elden *et al*. 2005; Nilsson-Wikmar *et al*. 2005; Haugland *et al*. 2006), whereas that of Stuge *et al*. (2004) investigated post-partum management. A total of 1244 patients were reviewed across all the studies, and sample sizes ranged from 90 (Depledge *et al*. 2005) to 569 patients (Haugland *et al*. 2006). The length of the interventions varied greatly, ranging from 1 (Depledge *et al*. 2005) to 20 weeks (Stuge *et al*. 2004).

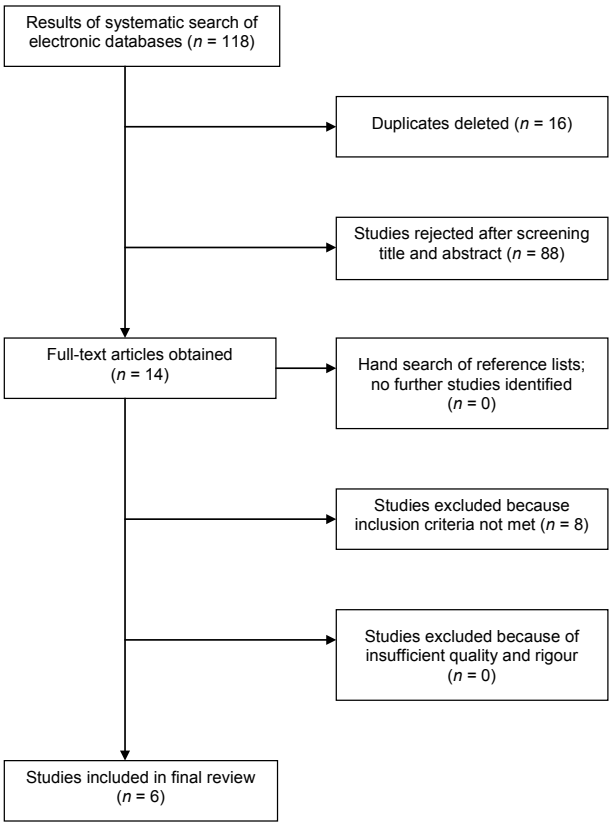

Figure 1. Summary of the search and selection process.

Table 2. Critical appraisal of the studies using the Physiotherapy Evidence Database (PEDro) scale. The total quality score is marked out of 10, and determined by counting the number of criteria that are met: (+) criterion is clearly satisfied; and (−) criterion is not satisfied

	PEDro scale criterion*											
Reference	E	1	2	3	4	5	6	7	8	9	10	Total score
Stuge *et al.* (2004)	√	+	+	+	−	−	+	+	−	+	+	7
Depledge *et al.* (2005)	√	+	−	+	−	+	+	+	−	+	+	7
Elden *et al.* (2005)	√	+	+	+	−	−	+	+	+	+	+	8
Nilsson-Wikmar *et al.* (2005)	√	−	−	−	−	−	+	+	+	+	+	5
Haugland *et al.* (2006)	√	+	+	+	−	−	+	−	−	+	−	5
Elden *et al.* (2008)	√	+	−	+	−	−	−	−	+	+	+	5

*Key: (E) eligibility criteria specified (does not contribute to the total score); (1) participants randomly allocated to groups; (2) allocation concealed; (3) groups similar at baseline; (4) participants blinded; (5) therapist administering treatment blinded; (6) assessors blinded; (7) measures of key outcomes obtained from over 85% of participants; (8) data analysed by intention to treat; (9) comparison between groups conducted; and (10) point measures and measures of variability provided.

Exercise programmes

All of the study authors incorporated physiotherapist-guided exercise and advice into at least one of their intervention groups, with or without the addition of a pelvic support belt, acupuncture or other physiotherapy treatment modality. An overview of the components of the evaluated interventions for each RCT is shown in Table 3. The type and frequency of exercise, the duration of the intervention, and the use of exercise equipment varied between the studies. Only two groups of authors (Stuge *et al.* 2004; Depledge *et al.* 2005) provided a detailed description of the exercise programmes involved in their published reports. They both used similar exercise programmes in their studies, targeting the abdominal muscles (i.e. the transversus abdominis, external and internal oblique, and multifidus muscles), the gluteus maximus, latissimus dorsi, and the hip abductor and adductor muscles. Depledge *et al.* (2005) also incorporated pelvic floor muscle exercises into their programme. The main difference between the two programmes was the use of exercise equipment; Depledge *et al.* (2005) did not use equipment, whereas Stuge *et al.* (2004) used a Norwegian exercise device consisting of ropes and belts to facilitate exercise progression. The other studies used more general terms to describe their exercise programmes; for example, ''strengthening exercises'', ''stabilization exercises'', ''mobilizing'' or ''stretching''.

Frequency of exercise

The prescribed frequency of exercise varied between the studies. Depledge *et al.* (2005) stipulated the highest daily frequency, asking their participants to perform the home exercise programme (HEP) three times a day, although the total intervention lasted for only one week. In the study by Elden *et al.* (2005), the group allocated to exercise at home continued over the course of 6 weeks, but no detail was given about the daily or weekly frequency. In contrast, those in the group prescribed specific stabilizing exercises were asked to perform the home exercises ''several times a day'' for 6 weeks. In the study by Nilsson-Wikmar *et al.* (2005), the in-clinic exercise group attended for physiotherapist-guided exercise twice a week until week 39 of pregnancy. However, the above authors failed to give any details regarding the frequency of home exercise for any of their intervention groups.

Haugland *et al.* (2006) reported that patients allocated to the intervention arm of their study attended group advice and exercise for 1 h every week over a period of 4 weeks. Like Nilsson-Wikmar *et al.* (2005), they also failed to give any indication of the frequency of home exercise performed by their participants. In the study by Stuge *et al.* (2004), the control group attended physiotherapy treatment every 2 weeks during the 20-week intervention period; however, although these authors inferred that exercises were continued at home, they did not provide any specific information. By contrast, although their intervention group attended the clinic at the same frequency as the control group, these participants were asked to perform a HEP for 30–60 min, three times a week, over the course of the intervention.

Effectiveness of exercise

The results of the studies varied with respect to the effectiveness of physiotherapist-guided exercise. The main statistical findings are

Table 3. Components of the interventions evaluated

Reference	Individual education and advice	Group education and advice	Telephone support	Pelvic support belt	Individualized physiotherapy treatment	Physiotherapist-guided exercise				Acupuncture
						Ongoing general exercise	Single session of stabilization exercises	Ongoing stabilization exercises	Home exercise programme	
Stuge *et al.* (2004)	✓				✓	✓		✓	✓	
Depledge *et al.* (2005)	✓			✓			✓		✓	
Elden *et al.* (2005)	✓			✓				✓	✓	✓
Nilsson-Wikmar *et al.* (2005)	✓		✓	✓		✓		✓	✓	
Haugland *et al.* (2006)		✓		✓				✓	✓	
Elden *et al.* (2008)	✓			✓				✓	✓	✓

summarized in Table 4. Depledge *et al.* (2005) reported a highly significant decrease in average and worst mean pain scores in all of their intervention groups. They found that average pain was significantly reduced in the exercise-only group and the group receiving the rigid belt, and worst pain significantly decreased in all groups. These authors concluded that the use of either a rigid or non-rigid pelvic support belt did not add to the effects provided by exercise and advice.

Elden *et al.* (2005) reported that their stabilizing exercise group had significantly less pain after treatment than the group receiving standard treatment (i.e. advice, a pelvic support belt, and a physiotherapist-guided HEP designed to increase abdominal and gluteal strength). Likewise, the acupuncture group had significantly less pain than the standard treatment group. These authors concluded that acupuncture and stabilizing exercises as an adjunct to standard treatment offer clear clinical advantages over standard treatment alone for the reduction of PPGP in pregnant women.

In their postnatal follow-up, Elden *et al.* (2008) reported that approximately three-quarters of all the participants were free of pain at 3 weeks post-partum, with 99% being pain-free at 12 weeks, leading these authors to conclude that, irrespective of treatment modality, regression of PPGP occurs in the vast majority of women within 12 weeks of delivery.

Haugland *et al.* (2006) reported that, at 6 months post-partum, the intervention group and the control subjects, who received no treatment, showed reductions of median pain scores of 73.3% and 71.7%, respectively. A further 6 months later, these scores had increased to 85% and 81.7% for the intervention and control groups, respectively. The above authors concluded that there were no significant differences between the two groups at either 6 or 12 months post-partum.

Nilsson-Wikmar *et al.* (2005) found a statistically significant reduction in median pain intensity in all three of their intervention groups between week 38 of gestation and 12 months post-partum. These authors concluded that women with PPGP seemed to improve with time in all three treatment groups, and that neither home nor in-clinic exercises had any additional value beyond the provision of a non-elastic pelvic support belt and information.

Stuge *et al.* (2004) reported that, both after the intervention and at 12 months post-partum,

Table 4. Summary of statistical results: (VAS) visual analogue scale; (PGP) pelvic girdle pain (HEP) home exercise programme; (CI) confidence interval; and (PPGP) pregnancy-related PGP

Reference	Outcome measure	Intervention	Main findings	Conclusion
Stuge *et al.* (2004)	Worst pain in the morning and evening (100-mm VAS)	Group 1: individualized physiotherapy treatment and exercise Group 2: as group 1, plus stabilizing exercises and provision of home exercise equipment	Statistically significant ($P<0.001$) difference between the two groups in favour of group 2 Group difference in median values for evening pain after treatment on the VAS = 30 mm	It was concluded that the results provided strong evidence for the effectiveness of a treatment programme focusing on stabilization exercises
Depledge *et al.* (2005)	Average and worst pain over preceding week (101-point VAS)	Group 1: advice and stabilization exercises Group 2: as group 1, plus non-rigid belt Group 3: as group 1, plus rigid belt	Highly significant ($P=0.00$) decrease in average and worst mean pain scores in all intervention groups	The use of either a rigid or non-rigid pelvic support belt did not add to the effects provided by exercise and advice
Elden *et al.* (2005)	Pain intensity related to motion (100-point VAS)	Group 1: advice, belt, strengthening exercises and HEP ("standard treatment") Group 2: as group 1, plus acupuncture Group 3: as group 1, plus stabilizing exercises	Group 2 had significantly less pain than group 1: (morning) difference in median pain scores = 12; 95% CI = 5.9 ± 17.3; $P<0.001$ (evening) difference in median pain scores = 27; 95% CI = 13.3 ± 29.5; $P<0.001$ Group 3 had significantly less pain than group 1: (morning) difference in median pain scores = 9; 95% CI = 1.7 ± 12.8; $P=0.0312$ (evening) difference in median pain scores = 13; 95% CI = 2.7 ± 17.5; $P=0.0245$	As an adjunct to standard treatment, acupuncture or stabilizing exercises offered significant clinical advantages over standard treatment alone for the reduction of PPGP in pregnant women
Nilsson-Wikmar *et al.* (2005)	Pain intensity (100-mm VAS)	Group 1: information, advice and belt Group 2: as group 1, plus HEP Group 3: as group 1, plus supervised exercise	No statistically significant differences between the three groups with respect to current pain intensity Significant reduction in median VAS pain scores in all three groups between 38 weeks gestation and 12 months post-partum ($P=0.00$ for all three groups) Overall reduction in median VAS pain scores: (group 1) 89.8% (group 2) 76.1% (group 3) 66.0%	Women with PPGP improved with time in all three groups; neither home nor in-clinic exercises had any additional value beyond simply supplying a non-elastic pelvic support belt and information
Haughland *et al.* (2006)	Pain intensity caused by four measured daily activities (100-mm VAS)	Group 1: group advice, education, stabilization exercises and HEP Group 2: no treatment	No statistically significant differences between the two groups at either 6 or 12 months post-partum Reduction in median VAS pain scores at 6 and 12 months, respectively: (group 1) 73.3% and 85.0% (group 2) 71.7% and 81.7%	Post-partum PGP improved with time in both the intervention and control groups
Elden *et al.* (2008)	Regression of PGP at 12 weeks post-partum (100-point VAS)	See Elden *et al.* (2005)	No statistical differences between any of the groups: 75% pain-free at 3 weeks post-partum 99% pain-free at 12 weeks post-partum	Irrespective of treatment modality, regression of PPGP occurs in the great majority of women within 12 weeks of delivery

their specific stabilizing exercise group showed a statistically and clinically significant lower pain intensity compared with the control subjects, who were not treated with such exercises. For morning and evening pain, there were large and significant differences between the groups after intervention and at 12 months post-partum. These authors concluded that their results provided strong evidence for the effectiveness of a treatment programme that focused on stabilizing exercises for women with PGP after pregnancy.

All of the studies included in the present review reported that PPGP reduced over time, regardless of the intervention used to treat it, suggesting that the greatest factor influencing the resolution of PPGP is time rather than exercise.

Discussion

Limitations of the studies included

The methodological quality, depth of statistical analysis and transparency of results varied between the six papers selected for analysis. These limitations were taken into account during the synthesis of the findings, and therefore, the data contained in each study had a variable impact on the final conclusions of the present systematic review.

For example, Elden *et al*. (2008) defined ''no pain'' as being a score of less than 10 on a 100-point visual analogue scale (VAS). Using this definition, these authors reported complete regression of PPGP in 99% of their participants at 12 weeks after delivery. If their definition of ''no pain'' had been a VAS pain score of zero, fewer of the women studied would have been considered pain-free, and their results would have been different. Since Elden *et al*. (2008) did not give an analysis of data in which ''no pain'' is defined as a VAS pain score of zero, it is not possible to determine how many of their participants were truly pain-free at the end of the trial.

Haugland *et al*. (2006) reported that 60% (171/285) of their ''no treatment'' control group had searched for treatment elsewhere, and therefore, the effects of their intervention programme may have been underestimated (a type II error). In Norway, a diagnosis of PPGP entitles a patient to free physiotherapy treatment (Haugland *et al*. 2006), and therefore, inclusion in the above study may have alerted the participants to their PPGP diagnosis, prompting the control group to seek treatment for their symptoms elsewhere.

Factors influencing adherence and compliance

The results of the six studies under review showed that compliance and adherence to treatment varied. Factors such as individual guidance and support from the physiotherapist appeared to positively influence adherence to the exercise regime, while other factors, such as problems with childcare, and limited time to attend appointments and continue with home exercises, negatively influenced adherence. Physiotherapists treating this patient group need to be mindful of these factors, and be flexible in their approach to treatment.

The exercise programme prescribed by Stuge *et al*. (2004) for their intervention group employed equipment to facilitate the exercises both in clinic and at home. While these authors' results indicate that the specific stabilizing exercises were more effective at reducing PPGP than physiotherapy treatment alone, their use of exercise equipment installed in their patients' homes reduced the suitability of this programme for use in normal clinical conditions. The cost of installing the equipment and the space needed to house it are factors that may reduce patient adherence to this exercise programme, and consequently, the clinical relevance of Stuge *et al*.'s (2004) findings is diminished.

Implications for clinical practice

The timing of physiotherapist-guided exercise in the management of patients with PPGP appears to be an important indicator of its success. The findings of the present review suggest that physiotherapist-guided stabilization exercises for the pelvic area are most beneficial during the post-partum period, while advice, information and the use of a non-elastic pelvic support belt are more effective in reducing pre-partum PPGP.

The present authors failed to find conclusive evidence to support the routine use of physiotherapist-guided exercise in the treatment of all women with PPGP. The results suggest that physiotherapy time and resources should be focused on treating patients with persistent symptoms of post-partum PPGP, at which point an individualized physiotherapist-guided exercise programme aimed at stabilizing the pelvic area should be considered as part of a wider package of physiotherapy treatment.

Implications for future research

All of the studies included in the present review examined the efficacy of physiotherapist-guided

exercises as part of a wider package of physiotherapy treatment. This made it difficult to estimate the true effect of the exercise programmes because the effects of the co-interventions were likely to have influenced the effects of the exercises.

Further research is needed to determine the optimal dosage of physiotherapist-guided exercise for the treatment of persistent PPGP during the post-partum period in order to clarify the benefits of exercise within a wider treatment package. Such research may best be performed as a prospective cohort study in which a defined group of participants are followed over time, and comparisons are made between those who did and did not receive the intervention (CRD 2008). Although prospective cohort studies are more susceptible to bias, these have the advantage of producing results that reflect so-called routine practice (CRD 2008), which is an important factor when determining whether results could be used to inform clinical practice in the wider community.

Conclusions

The present review did not produce any conclusive evidence to support the routine use of physiotherapist-guided exercise to treat all women with PPGP. However, the findings do suggest that:

- Pregnancy-related pelvic girdle pain reduces over time, regardless of the intervention used to treat it.
- First-line management of pre-partum PPGP should involve advice, information and the provision of a non-elastic pelvic support belt.
- Physiotherapist-guided exercises for the treatment of persistent PPGP are most beneficial during the post-partum period.
- Women with persistent symptoms of PPGP in the post-partum period should be treated with an individualized physiotherapist-guided exercise programme aimed at stabilizing the pelvic area, and this should be part of a wider package of physiotherapy treatment.
- Physiotherapists treating this patient group need to be mindful of the factors that positively and negatively influence adherence to an exercise programme, and be flexible in their approach to treatment.
- Further research is needed to establish the optimal exercise regime for persistent post-partum PPGP so that physiotherapists have adequate information to produce effective and evidence-based treatment protocols.

Acknowledgements

I would like to acknowledge the unwavering support that I received from my family and friends during my MSc studies, particularly my father, who proof-read every assignment, and offered invaluable advice and encouragement throughout the 4-year process.

References

Albert H. B., Godskesen M. & Westergaard J. G. (2002) Incidence of four syndromes of pregnancy-related pelvic joint pain. *Spine* **27** (24), 2831–2834.

Association of Chartered Physiotherapist's in Women's Health (ACPWH) (2007) *Pregnancy-Related Pelvic Girdle Pain (Guidance for Health Professionals)*. Association of Chartered Physiotherapist's in Women's Health, London.

Centre for Reviews and Dissemination (CRD) (2008) *Systematic Reviews: CRD's Guidance for Undertaking Reviews in Health Care.* Centre for Reviews and Dissemination, University of York, York.

Depledge J., McNair P. J., Keal-Smith C. & Williams M. (2005) Management of symphysis pubis dysfunction during pregnancy using exercise and pelvic support belts. *Physical Therapy* **85** (12), 1290–1300.

Elden H., Ladfors L., Olse, M. F., Ostgaard H.-C. & Hagberg H. (2005) Effects of acupuncture and stabilising exercises as adjunct to standard treatment in pregnant women with pelvic girdle pain: randomised single blind controlled trial. *BMJ* **330** (7494), 761.

Elden H., Hagberg H., Olsen M. F., Ladfors L. & Ostgaard H. C. (2008) Regression of pelvic girdle pain after delivery: follow-up of a randomised single blind controlled trial with different treatment modalities. *Acta Obstetricia et Gynecologica Scandinavica* **87** (2), 201–208.

Haugland K. S., Rasmussen S. & Daltveit A. K. (2006) Group intervention for women with pelvic girdle pain in pregnancy. A randomized controlled trial. *Acta Obstetricia et Gynecologica Scandinavica* **85** (11), 1320–1326.

Kanakaris N. K., Roberts C. S. & Giannoudis P. V. (2011) Pregnancy-related pelvic girdle pain: an update. *BMC Medicine* **9:** 15. DOI: 10.1186/1741-7015-9-15.

Langshaw W. (2011) Acupuncture and its use in the management of low back and pelvic girdle pain in pregnancy. *Journal of the Association of Chartered Physiotherapists in Women's Health* **108** (Spring), 24–34.

Maher C. G., Sherrington C., Herbert R. D., Moseley A. M. & Elkins M. (2003) Reliability of the PEDro scale for rating quality of randomized controlled trials. *Physical Therapy* **83** (8), 713–721.

Nilsson-Wikmar L., Holm K., Öijerstedt R. & Harms-Ringdahl K. (2005) Effect of three different physical therapy treatments on pain and activity in pregnant women with pelvic girdle pain: a randomized clinical trial with 3, 6, and 12 months follow-up postpartum. *Spine* **30** (8), 850–856.

Physiotherapy Evidence Database (PEDro) (2014) *PEDro scale*. [WWW document.] URL http://www.pedro.org.au/english/downloads/pedro-scale

Popay J., Roberts H., Sowden A., *et al*. (2006) *Guidance on the Conduct of Narrative Synthesis in Systematic Reviews: Final Report*. ESRC Methods Programme, Swindon, Wiltshire.

Robinson H. S., Eskild A., Heiberg E. & Eberhard-Gran M. (2006) Pelvic girdle pain in pregnancy: the impact on function. *Acta Obstetricia et Gynecologica Scandinavica* **85** (2), 160–164.

Stuge B., Hilde G. & Vøllestad N. (2003) Physical therapy for pregnancy-related low back and pelvic pain: a systematic review. *Acta Obstetricia et Gynecologica Scandinavica* **82** (11), 983–990.

Stuge B., Lærum E., Kirkesola P. & Vøllestad N. (2004) The efficacy of a treatment program focusing on specific stabilizing exercises for pelvic girdle pain after pregnancy: a randomized controlled trial. *Spine* **29** (4), 351–359.

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 H. B., Östgaard H. C., Sturesson B. & Stuge B. (2008) European guidelines for the diagnosis and treatment of pelvic girdle pain. *European Spine Journal* **17** (6), 794–819.

Wu W. H., Meijer O. G., Uegaki K., *et al*. (2004) Pregnancy-related pelvic girdle pain (PPP), 1: Terminology, clinical presentation, and prevalence. *European Spine Journal* **13** (7), 575–589.

Rachel Bromley is the Lead Women's Health Physiotherapist for Nuffield Health, and works as a specialist women's health and continence physiotherapist at Nuffield Health Shrewsbury Hospital. She has recently completed an MSc in Rehabilitation Studies (Continence for Physiotherapists) at the University of Bradford. This paper is based on some of the findings of her research dissertation, for which she was awarded a distinction.

Dr Pamela Bagley is the Dean of the School of Health Studies at the University of Bradford, and acted as Rachel's academic supervisor during the final stage of her MSc.