LITERATURE REVIEW

Physiotherapy for chronic pelvic pain: a review of the latest evidence

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Abstract

Chronic pelvic pain (CPP) is a complex and debilitating condition that is prevalent worldwide. The symptoms of the condition fit a biopsychosocial model of pain, and can include bladder, bowel and sexual dysfunction. The cause of CPP is often unclear, as are the most effective interventions. There is a shortage of skilled physiotherapists in the UK, and patients often only access physiotherapy as a last resort. Multidisciplinary team (MDT) programmes are effective in managing chronic low back pain, and the same type of initiatives may be effective for CPP. The aim of this literature review was to identify and synthesize evidence from recent empirical quantitative studies in order to answer the following question: is physiotherapy effective in the management of CPP in men and women aged 18 years and older, and if so, which treatment protocols are best? Nine studies were assessed for methodological quality. The results from seven poor- and moderate-quality randomized controlled trials (RCTs) exhibited a trend: standalone physiotherapy interventions appeared to have only a small positive effect on pain scores and function. However, the sample sizes involved were small and larger trials are needed. Two studies were of such poor quality that these could not be included in the summary of the findings. The results from two larger samples in clinical case series demonstrated that MDT programmes may be effective in the treatment of both men and women. However, these studies were too varied in terms of intervention and design to allow any meaningful meta-analysis to be performed. One RCT showed that extracorporeal shockwave therapy may be effective for male CPP, but better placebos are required to establish this conclusively. Two RCTs that involved electroacupuncture reported efficacy in pain reduction, but both were of poor quality. Multidisciplinary team programmes showed the highest functional improvement. Future studies should consider a standardized MDT protocol for trial in a UK National Health Service setting, and continue to build on the evidence base that exists.

Keywords: chronic pelvic pain, physiotherapy, randomized controlled trials.

Introduction

Background

Chronic pelvic pain (CPP) is prevalent worldwide (Latthe *et al.* 2006), affecting 8–25% of women (Zondervan *et al.* 1999; Latthe *et al.* 2006) and approximately 8–15% of men (Clemens *et al.* 2006). It is a debilitating condition that has a complex biopsychosocial make-up. The symptoms of CPP can affect bladder, bowel and/or sexual function (RCOG 2012), which can contribute to a significant reduction in quality of life (Stones *et al.* 2000; Romão *et al.* 2013; de Sousa *et al.* 2016). Chronic pain is characterized by its persistence in the absence of acute injury, pathology or inflammation, and may be caused by complex changes in the neural system rather than actual tissue damage. One review of chronic pain found that socioeconomic and psychological factors contribute to the condition as much as biological causes (van Hecke *et al.* 2013). Clinicians supporting individuals with such a diagnosis face two challenges:

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patients' needs are often multifactorial; and evidence for the efficacy of interventions remains inconclusive.

The lack of an evidence base in this area is both surprising, and given the prevalence of CPP in the UK, a matter of concern. This condition is the most common reason for referral to women's health services in secondary care, accounting for around 20% of outpatient appointments (Latthe *et al.* 2006). The most recent estimate of National Health Service (NHS) spending for female CPP was £158 000 000 per annum (Latthe *et al.* 2006). Although less common in men, it can account for up to 15% of male urology appointments (Clemens *et al.* 2006). However, the prevalence of CPP could be higher than the recorded figures. This is because the sensitive nature of loss of sexual function and bladder control may result in under-reporting. Furthermore, the condition does not display any visible symptoms, and therefore, is less likely to be diagnosed incidentally by clinicians treating patients for other conditions.

In addition to the debilitating effect of the condition, individuals may undergo multiple procedures in primary care without a clear diagnosis being made before intervention by a specialist team (RCOG 2012). Anecdotal evidence suggests that patients receive physiotherapy as a last resort.

The current guidance for physiotherapists is inadequate. The European Association of Urology guidelines for CPP recommend the use of multimodal physiotherapy (Fall *et al.* 2012), but no estimate of the efficacy of this approach appears in the literature. The results of a Cochrane review of physiotherapy for CPP were inconclusive because of a lack of robust evidence (Cheong *et al.* 2014). A review 2 years earlier suggested that there was some evidence to support the use of multidisciplinary team (MDT) interventions for pain management and somatocognitive therapy (Loving *et al.* 2012). With no evidence-based guidance available, clinicians may provide patients with ineffective treatments unless service evaluations are completed and scrutinized locally.

Current practice varies widely between clinicians and clinic protocols, and is largely based on experiential learning and published case studies. To date, there is no standardized practice, and the evidence base may confuse novice researchers and clinicians, rendering clinical decision-making problematic in complex cases. As a result of an increase in demand for physiotherapy in the MDT care of CPP patients in NHS hospitals and specialist services, physiotherapists in the UK require a guidance document relevant to this specialty. For service managers, this guidance would support pathway and policy development for women's and men's health services dealing with CPP.

In a systematic review of physiotherapy for chronic low back pain (LBP), MDT rehabilitation programmes including physiotherapy were shown to result in improvements in pain, disability and speed of return to work (van Middelkoop *et al.* 2011). Multidisciplinary team programmes are now offered at many hospitals that specialize in pain, and their success rates are well documented (CSP 2018). Similar outcomes and programmes may be possible for patients with CPP, but more evidence is needed to create a strong case for service development and funding. The lack of evidence and awareness is potentially preventing more widespread treatment of CPP with physiotherapy. Physiotherapists have both the opportunity and responsibility to provide evidence for effective, reproducible intervention protocols.

Review question

Is physiotherapy effective in the management of CPP in men and women aged 18 years and older, and if so, which treatment protocols are best?

Review objectives

The objectives of the present literature review were to:

- determine the effect of physiotherapy on pain scores;
- determine the effect of physiotherapy on function scores (e.g. bladder, bowel and sexual function); and
- provide a background evidence base for policy and guidelines for physiotherapists, and make clinical recommendations for implementation in local services.

Materials and methods

Search strategy

A literature search was undertaken using the following databases: MEDLINE, CINAHL, PsycArticles, SPORTDiscus, AMED, PROSPERO and PEDro. Searches were filtered by: keywords in titles and abstracts; date range (2011–2018); male and female adults; and papers written in English. The keywords used were "chronic pelvic pain", "physiotherapy" and "randomized controlled trials" (RCTs). Grey literature was identified via the OpenGrey website

(www.opengrey.eu), and others relevant to urology, pain, sexual medicine and gynaecology. Manual searches were carried out for individual journal titles using key authors who have published in the past 5 years. Duplicate records were removed using the EndNote software package (Clarivate Analytics, Philadelphia, PA, USA).

Screening for eligibility

Figure 1 is a Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart (Moher *et al.* 2009; PRISMA 2009) illustrating the search strategy, and the process of selecting and eliminating studies. The PICO (participants, interventions, comparisons and outcomes) criteria (Higgins & Green 2011) were used to screen 66 abstracts that met the search criteria: selected studies were exported into included or excluded electronic files in EndNote. Forty-three were excluded on the basis of the study type or participants involved. A further 14 papers were excluded because of the type of intervention made, leaving the nine that were included in the present review.

Methodological quality and bias assessment

A modified version of the Scottish Intercollegiate Guidelines Network checklists for the assessment of methodological quality (SIGN 2012) was completed for the RCTs that met the inclusion criteria (see Table 4 below). For the purpose of the present review, the author assessed the validity of the case series (Anderson *et al.* 2015; Brotto *et al.* 2015), combining the list of 25 questions from the Institute of Health Economics (IHE 2016) with the SIGN checklist for case-control studies, and acknowledging that the control group was absent (see Table 5 below). The key shown below was also used to indicate the quality of the evidence. Each study was given a score (see Table 4 below).

The methodological quality score was annotated with the symbols shown in Table 1, which were adapted for the present review.

All of the outcome measures were checked for validity and reliability by searching either the Chartered Society of Physiotherapy database (CSP 2020), or published journal articles on validation studies.

Data extraction

Data for pain and function were extracted onto a customized table in a Microsoft Word document (Microsoft Office for Mac, Version 15.32, Microsoft Corporation, Redmond, WA, USA). The percentage change for each study result was calculated manually and added into the data extraction tables. The summary of statistics in Table 2 was calculated to aid readers, and to present the median and range of the studies'

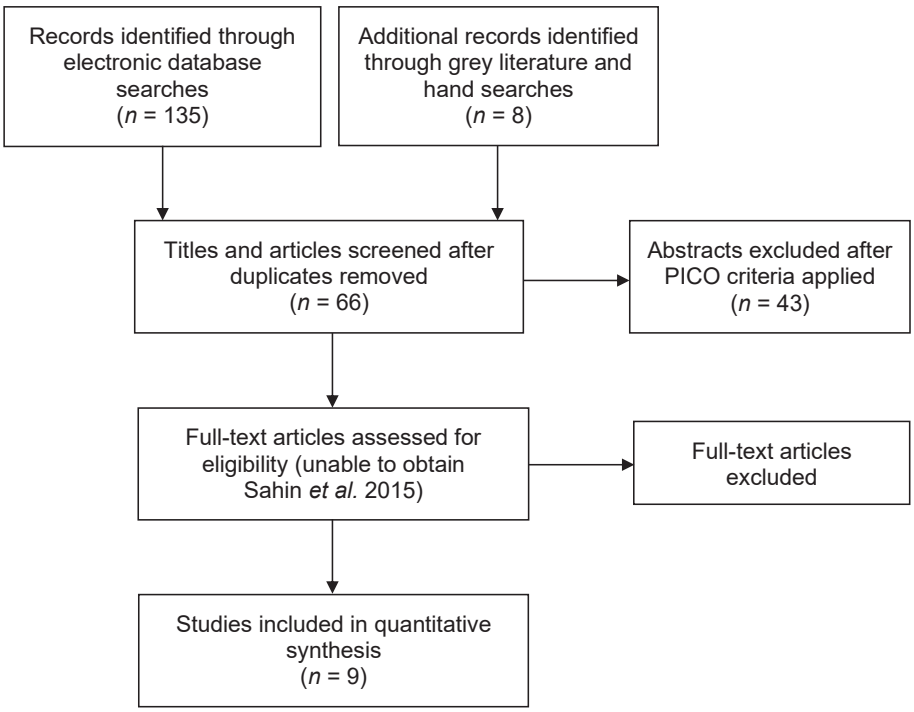

Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart demonstrating the literature search strategy (Moher *et al.* 2009; PRISMA 2009): (PICO) participants, interventions, comparisons and outcomes.

Table 1. Methodological quality score: (RCT) randomized controlled trial

Symbol	Quality	Definition
++	High	Majority of criteria met Little or no risk of bias No further RCTs needed
+	Moderate	Most criteria met Some flaws in the study, with an associated risk of bias Conclusions may change in the light of further studies
–	Low	Some or most of criteria not met, or significant flaws relating to key aspects of study design Conclusions likely to change in the light of further studies

Table 2. Summary of statistics

		Percentage	
Variable	Number	Median	Range
Pain score reduction	9	23	17.0–39.0
Functional improvement	8	22	15.8–43.0

findings since no meta-analysis was possible. Individual percentages were calculated by dividing the actual visual analogue scale (VAS) or functional scores by the denominator, and multiplying by 100 (e.g. $x/10 \times 100$ for VAS scores). Statistical data are also presented for each individual study (see Table 6 below), along with the *P*-values and actual scores, and the authors' calculated percentages in brackets. A narrative synthesis was structured by grouping the studies under the titles of four intervention types. Descriptive statistics are discussed as *P*-values as well as percentage change, which was used for a more meaningful discussion of values.

Clinical and significant levels of change

During the review process, a pragmatic approach to the study protocols and results was needed to determine whether treatment protocols with statistically significant efficacy in experimental settings can be considered for use in clinical practice. Gianola *et al.* (2018) explained the importance of minimally important difference (MID): for chronic LBP treatments, MID levels of a $\geq 50\%$ reduction in disability were determined to be more meaningful to patient outcomes. It has been suggested that a MID level of a 15–20% reduction in pain scores should be considered clinically effective (Ostelo *et al.* 2008; van Middlekoop *et al.* 2011). To establish a clinical effectiveness guideline for the purposes of the present review, the author set the level of MID or "clinical significance" as a $\geq 20\%$ improvement on a VAS for pain measurement, or a $\geq 50\%$ improvement in function scores. Both of these thresholds were applied only for patients with chronic conditions of ≥ 3 months' duration.

Literature search results

Using all the terms for CPP and physiotherapy, more than 100 000 records were returned. These publications included case studies, editorials, reviews and qualitative studies. This number was unmanageable for one researcher, and therefore, another automated search filter was added. By using an automated search term filter for quantitative study types, such as "RCT" or "cohort study", the results were reduced to 135 papers, a more practicable amount of data. Contacting the clinical centres yielded no new clinical data from the three NHS CPP clinics. This was either because of a lack of response or an unwillingness to release data, or outcome measures were not consistent. Publication bias was avoided by hand-searching the indexes of theses, conference presentations and abstracts of relevant societies, but no new studies were discovered.

Sample size and data quality

The data sets found indicate the dearth of quantitative studies to date, and also the variable quality of data collection and RCT reporting. The findings of the present review include just 720 patients from nine studies: 541 received physiotherapy-based interventions; and 212 acted as control subjects.

Characteristics of excluded studies

After reading the full-text articles, 14 studies were excluded for the following reasons: three for the types of participants included; six for the types of interventions made; four for the study design (i.e. two protocols, one report and one pilot study with insufficient power to detect any change); and one (Sahin *et al.* 2015) for which the present author was unable to obtain the full text by the time of writing (see the PRISMA flowchart in Fig. 1).

Results

The characteristics of the studies included in the present literature review are detailed in Table 3.

Table 3. Characteristics of studies included in the literature review: (RCT) randomized controlled trial; (CPP) chronic pelvic pain; (VAS) visual analogue scale; (NIH-CPSI) National Institutes of Health Chronic Prostatitis Symptom Index; (FSFI) Female Sexual Function Index; (FSDI) Female Sexual Dysfunction Index; (TrP) trigger point; (EA) electroacupuncture; (CP) chronic prostatitis; and (ECSWT) extracorporeal shockwave therapy

Reference	Country	Study design	Physiotherapy intervention	Participants	Duration of treatment	Outcomes assessed
Anderson *et al.* (2011, 2015)	USA	Case series (uncontrolled observational study)	Combined physiotherapy, self-treatment relaxation and psychological therapy	314 men and 79 women with urological CPP	3- to 5-h sessions for 6 days (intensive)	VAS, global response rate and NIH-CPSI
FitzGerald *et al.* (2012)	USA	Single-blind RCT	Myofascial physical therapy versus global therapeutic massage	81 women with interstitial cystitis/painful bladder syndrome and pelvic floor tenderness	Ten, 60-min sessions for 12 weeks	VAS and FSFI
Zeng *et al.* (2012)	China	Single-blind RCT	ECSWT versus sham	80 men CP and CPP	Ten sessions over 2 weeks	NIH-CPSI (including pain VAS)
Vahdatpour *et al.* (2013)	Iran	RCT	ECSWT versus sham	40 men with CPP	One session a week for 4 weeks	NIH-CPSI (including pain VAS)
Kessler *et al.* (2014)	Switzerland	Double-blind RCT	Sono-electromagnetic therapy for the pelvic floor	60 men with CPP	Twice a day for 10 min over 12 weeks	NIH-CPSI (including pain domain VAS)
Brotto *et al.* (2015)	Canada	Case series	Combined psychological therapy and physiotherapy	132 women with provoked vestibulodynia	10 weeks of individual and group sessions.	VAS, global response rate, FSFI and FSDI
Küçük *et al.* (2015)	Turkey	RCT	EA versus pharmacological treatment	54 men with CPP	Two EA sessions a week for 7 weeks Levofloxacin twice a day and ibuprofen four times a day for 6 weeks	Response rate/NIH-CPSI including pain domains
Montenegro *et al.* (2015)	Brazil	RCT	Abdominal wall manual TrP release versus injection of lidocaine	30 women with CPP and painful abdominal TrPs	Three repetitions of 60 s on TrP/30 s rest once a week for 4 weeks Injection of 2 mL of lidocaine into TrPs weekly for 4 weeks (a total of four injections in each)	Pain VAS and response rate
Zhou *et al.* (2017)	China	Single-blind RCT	Long-needle acupuncture versus traditional acupuncture	77 men with CPP	Six sessions over 2 weeks	VAS and NIH-CPSI

No high-quality RCTs were found, but four were deemed to be of moderate quality and three of low quality (see Table 4). Two further case series of moderate quality evaluated MDT programmes (see Table 5).

Meta-analysis was precluded by the diversity of protocols and interventions used, and also by inconsistencies in reporting and design, all of which resulted in a lack of homogeneity. Meaningful analysis was completed by a narrative synthesis that divided the results by the type of modality examined. Table 2 shows a summary of the results. These findings were manually calculated as percentages because, for the reasons stated above, the *P*-values for each study were not based on consistent measures (see Table 6 for complete data extraction of individual study results).

Improvements in pain scores ranged from 17% to 39%, with a median of 23% ($n = 9$). For functional improvements from the same studies, scores ranged from 15.8% to 43%, with a median of 22% ($n = 8$). This result excludes one value reported by Montenegro *et al.* (2015) because there was insufficient data at the end point of the intervention. Therefore, physiotherapy does affect the MID for pain, but not function.

The seven RCTs investigated a single, standalone intervention with a control group comparator (FitzGerald *et al.* 2012; Zeng *et al.* 2012; Vahdatpour *et al.* 2013; Kessler *et al.* 2014; Küçük *et al.* 2015; Montenegro *et al.* 2015; Zhou *et al.* 2017). The *P*-values are included in Table 6.

The case series involved MDT treatment programmes (Anderson *et al.* 2015; Brotto *et al.* 2015). These results are summarized below by intervention type, as recommend by Higgins & Green (2011).

Multidisciplinary team programmes

Two large sets of data derived from case series (Anderson *et al.* 2015; Brotto *et al.* 2015) were used to investigate the effect of MDT programmes combining education, psychotherapy and physiotherapy.

Table 6 shows that Anderson *et al.* (2015) reported the most effective combined results for pain reduction (25%, $P = 0.08$) and functional improvement (43%, $P < 0.001$) in a higher-quality study of 392 males and females. (For the study protocols, see Table 3.) The physiotherapy modalities consisted of manual trigger point release, including use of a take-home "wand" for the self-administration of muscle release.

Brotto *et al.* (2015) reported a 23% reduction in pain ($P = 0.001$), and a 17% ($P = 0.001$) improvement in scores on the 34-item Female Sexual Function Index. A combination of psychotherapy, one-to-one and group physiotherapy sessions, and a pain education programme was employed in a sample of 132 women. These results support the findings of an earlier systematic review that suggested that MDT programmes may be effective (Loving 2011).

The studies by Anderson *et al.* (2015) and Brotto *et al.* (2015) both involved a higher number of participants, and demonstrated significant levels of change that exceeded the MID for pain, but not function.

Electroacupuncture

Zhou *et al.* (2017) reported significant improvements in pain VAS and National Institutes of Health Chronic Prostatitis Symptom Index (NIH-CPSI) scores in an RCT that compared long-needle electroacupuncture (EA) and traditional EA. For pain, there was an improvement of 39% ($P < 0.05$) for the long-needle EA group compared to 22.5% ($P < 0.05$) for those receiving traditional EA. Statistically significant improvements ($P < 0.05$) in function of 40% and 21.8%, respectively, were reported for both groups (Table 6); separate *P*-values were not described for the two groups. These results are questionable because no baseline scores were published, there was no blinding of participants, confounding variables were not reported and there was evidence of selection bias (self-selection for treatment by participants).

Another low-quality RCT of 54 males (Küçük *et al.* 2015) compared two groups receiving either EA or medical acupuncture. Improvements of 33.2% and 19.45%, respectively, were reported for pain (no *P*-values given), and function scores for NIH CPSI were reduced by 29.1% and 14.9%, respectively. No within-group *P*-values were described for function. However, Küçük *et al.* (2015) reported statistically significant changes ($P = 0.001$) for function in favour of EA using Student's *t*-test for a comparison between the two groups.

The results of these two studies suggest that EA may have a very positive effect on CPP in males, but no conclusive recommendations can be made until higher-quality studies with protocols that can be repeated by physiotherapists and tested on females are performed.

Electrotherapy

Three studies trialling electrotherapy were conducted on male-only samples (Zeng *et al.*

Table 4. Assessment of the methodological quality of the randomized controlled trials included in the literature review: (1) clear question; (2) randomization; (3) allocation concealment; (4) assessor/subject blinding; (5) baseline similarity; (6) received intervention only; (7) outcome measures; (8) attrition total or treatment/control (%); (9) intention-to-treat analysis; (10) multi-site comparable; and (11) overall score of methodology

Reference	Variable											Notes of further sources of bias/ reliability of results
	1	2	3	4	5	6	7	8	9	10	11	
FitzGerald *et al.* (2012)	Yes	Yes	Yes	Yes/ yes	Yes	Unclear	Yes	23/33 (12 weeks + 76/41)	Yes	Unclear	+	Funding ran out/stopped recruiting early before preferred sample size
Zeng *et al.* (2012)	Yes	Yes	Yes	No/yes	Yes	Yes	Yes	6	Unclear	Not reported	+	Intention-to-treat analysis
Vahdatpour *et al.* (2013)	Yes	Yes	Unclear	No/no	Yes	Unclear	Yes	Unclear	Unclear	Not reported	–	Poor internal validity Convenience sampling
Kessler *et al.* (2014)	Yes	Yes	Yes	Yes/ unclear	Yes	Unclear	Yes	18	Yes	Not reported	+	Financial bias: funded by the manufacturer, Sonodyn Corporation AG, Solothurn, Switzerland, and the University of Bern, Bern, Switzerland
Küçük *et al.* (2015)	Yes	Yes	Unclear	No	Yes	Unclear	Yes	0	Unclear	Not reported	–	Interpretation bias Poorly written English No attempt at blinding
Montenegro *et al.* (2015)	Yes	Yes	Unclear	Yes/ unclear	Yes	Yes	Yes	Ceased after 2 weeks	Yes	Not reported	+	Ethics committee stopped trial early because of one group significantly improving more Limit to usefulness of whole-study results Results have insufficient power for control group
Zhou *et al.* (2017)	Yes	Yes	Yes	Yes/ unclear	Unclear	Unclear	Yes	12	Yes	Not reported	–	Selection bias/recruitment not described

Table 5. Assessment of the methodological quality of the case series included in the literature review: (1) clear study objective; (2) design (e.g. prospective); (3) subject selection/population; (4) assessment/outcome measures; (5) confounding intervention/co-intervention; (6) outcome measures; (7) statistical analysis; (8) results and conclusions; and (9) overall score of methodology

	Variable									
Reference	1	2	3	4	5	6	7	8	9	Notes on results/other biases
Anderson *et al.* (2011, 2015)	Yes	Unclear	No	Yes	Yes	Yes	Yes	Yes	+	Self-referred subjects, but where and how was this advertised, and were subjects paid? Highly motivated patients
Brotto *et al.* (2015)	Yes	Yes	Yes/ partial	Yes	Partial	Yes	Yes	Yes	+	Baseline biased because women who chose to enter the study had higher distress and pain scores/ overestimation of effect Duration of symptoms not clear

2012; Vahdatpour *et al.* 2013; Kessler *et al.* 2014).

A single-blinded RCT involving 80 participants compared a treatment group receiving 12 weeks of extracorporeal shockwave therapy (ECSWT) with sham controls (Zeng *et al.* 2012). The authors of this moderate-quality study described a 30% reduction in pain (no *P*-value reported) after 12 sessions, and a 23% ($P < 0.01$) improvement in functional NIH-CPSI scores. The sham control group values were not reported, but a between-groups analysis showed a statistically significant effect for function ($P \leq 0.05$).

Another RCT comparing ECSWT to sham treatment also found positive effects (Vahdatpour *et al.* 2013). The authors reported a 22% reduction in pain for the ECSWT group compared to sham controls ($P < 0.0001$), and a between-groups analysis of NIH-CPSI scores showed a 16% improvement in function ($P < 0.001$). However, the methodological quality of this study was poor in terms of its internal validity and convenience sampling.

A double-blinded RCT of 60 participants by Kessler *et al.* (2014) involved the portable Sonodyn device (Sonodyn Corporation AG, Solothurn, Switzerland), an electromagnetic and ultrasonic therapy machine that is not available in the UK. They reported no meaningful or statistically significant pain reduction or functional improvement.

In summary, there is some evidence that ECSWT reduces pain, but more studies are needed because the sample sizes in those reviewed above were too small. It is possible that evidence from future systematic reviews of ECSWT will change this conclusion. However, at present, there is not enough evidence to recommend ECSWT in the treatment of CPP, and there is no evidence for any other type of electrotherapy. These are the first studies on the use of ECSWT on CPP, and no adverse effects have been reported.

Manual therapy

Only one moderate-quality RCT addressed the efficacy of standalone manual therapy in the treatment of CPP (FitzGerald *et al.* 2012). A myofascial trigger point (MTP) release treatment referred to by the authors as myofascial physical therapy (MPT) was trialled against global therapeutic massage (GTM) for 12 weeks. Reductions in pain of 22% and 15% were reported for the MPT and GTM groups, respectively (no *P*-values were reported). The between-groups differences reported for pain ($P = 0.27$) and function ($P = 0.67$) were not significant.

A further RCT with a sample of 30 females demonstrated statistically significant differences in pain reduction between women who received MTP injections of lidocaine, and those who underwent manual MTP release on the abdominal wall (Montenegro *et al.* 2015). This trial was unable to answer the present review question because it was stopped early for ethical reasons: the lidocaine group showed a four-fold improvement after 3 weeks compared to those receiving manual MTP. Montenegro *et al.*'s (2015) results have been excluded from the present review's statistics because their study was incomplete.

Anderson *et al.* (2015) showed that the use of manual therapy techniques in MDT programmes had a strong effect on pain and function.

Discussion

The results of the present literature review indicate that physiotherapy generally reduces pain and improves function in patients with CPP.

Table 6. Summary of the pain and function results reported in the studies included in the literature review (outcomes as reported from the data extraction for pain scales and function scales): (VAS) visual analogue scale; (TrP) trigger point; (IQR) interquartile range; (ITT) intention to treat; (N/A) not applicable; (MTP) myofascial physical therapy; (GTM) global therapeutic massage; (ECSWT) extracorporeal shockwave therapy; (C) control; (SEMT) sono-electromagnetic therapy; (EA) electroacupuncture; (MA) medical acupuncture; (NR) not reported; (MTrPR) manual TrP release; (LI) lidocaine injection; (LA) long-needle acupuncture; and (TA) traditional acupuncture

Reference	Intervention versus control	Time point at which measured after randomization or group allocation	Mean difference on VAS (percentage reduction) and reported *P*-value		Mean difference in total function score (percentage reduction) and reported *P*-value	
			Within-group change	Between-groups difference	Within-group change	Between-groups difference
Anderson *et al.* (2011, 2015)	Combined psychological therapy and physiotherapy (TrP release)	6 months	TrP sensitivity = 0–10 Median (IQR) = 2.5 (1.5–4.5)/10 (25%) (men); 2.5 (0.0–4.0)/10 (25%) (women) *P* = 0.08 with modified ITT	N/A	For only 200 men Median (IQR) = 19 (13–25)/43 ≈ 43% (30.2–58%) *P* < 0.001* Global response = 82% (improved by slight, moderate or marked amount)	N/A
FitzGerald *et al.* (2012)	MPT versus GTM	12 weeks	MPT = 2.2 ± 2.2/10 (22%) GTM = 1.5 ± 2.1/10 (15%) No *P*-values	*P* = 0.27	MPT = 2.0 ± 5.6/36 (5.5%) GTM = 2.3 ± 7.5/36 (6.3%)	MPT = 59% (responders)/41% (non-responders) GTM = 26% (responders)/73% (non-responders) *P* = 0.67 Favours GTM
Zeng *et al.* (2012)	ECSWT versus sham (C)	12 weeks	ECSWT = 6/20 (30%) C = +1/20 (5%), worse pain No *P*-values	7/20 points (35%)* No *P*-value	ECSWT = 10/43 *P* < 0.01 (23%)* C = not reported	10/43 (23%) *P* ≤ 0.05* Favours ECSWT
Kessler *et al.* (2014)	SEMT versus placebo (C)	16 weeks	SEMT = 3.4/20 (17%) C = 2.6/20 (13%)	1.2/20 *P* = 0.24†	SEMT = 6.8/43 (15.8%) C = 3.4 (7.9%)	3.1/43 *P* = 0.11†
Brotto *et al.* (2015)	Combined psychological therapy, physiotherapy and pain education	12 weeks	0–6 scale (higher number indicates less pain) = 3.75 *P* = 0.001 (23%)	N/A	Increase of 6 units (0–34 scale used) 6/34 = 17% *P* = 0.001*	N/A
Küçük *et al.* (2015)	EA versus MA	10 weeks	EA = 6.65 ± 3.73/20 (33.2%) MA = 3.89 ± 2.97/20 (19.45%)	Value NR *P* = 0.007* Favours EA	EA = 12.54 ± 4.95/43 (29.1%) MA = 6.43 ± 4.95/43 (14.9%)	Value NR *P* = 0.001* Favours EA
Montenegro *et al.* (2015)	MTrPR versus LI	12 weeks	Percentage pain relief: MTrPR = 8.5% *P* = 0.47 LI = 69.9% *P* = 0.03*	61.4% Favours lidocaine	No measures of function made	No measures of function made
Zhou *et al.* (2017)	EA: LA versus TA	22 weeks	LA = 7.8/20 (39%) *P* < 0.05* TA = 4.5/20 (22.5%) *P* < 0.05*	3.3/20 (7.6%) *P* < 0.05* Favours LA	LA = 17.2/43 (40%) *P* < 0.05* TA = 9.4/43 (21.8%) *P* < 0.05*	4.7/43 (11.9%) *P* < 0.05* Favours LA

*Statistically significant.
†Non-significant.

Six studies appear to show statistically significant *P*-values for reductions in pain and function. However, a combination of both clinically significant levels set by the review (i.e. ≥ 20% and ≥ 50% for pain and functional improvement scores, respectively) was not achieved by any of the physiotherapy interventions. A pain reduction of ≥ 20% was demonstrated in seven studies, and reached statistically significant levels for long-needle EA (Zhou *et al.* 2017), ECSWT (Zeng *et al.* 2012; Vahdatpour *et al.* 2013), MDT programmes (Anderson *et al.* 2015; Brotto *et al.* 2015) and EA (Küçük *et al.* 2015). In clinical practice, all but one of these treatments (the exception being MDT programmes) are not easily available, and most physiotherapists would need additional training to provide these. For functional scores, no studies reached ≥ 50% improvement. One RCT trialling long-needle EA (Zhou *et al.* 2017) demonstrated the greatest improvement on the NIH-CPSI, i.e. 40% ($P < 0.05$), but this treatment may be difficult to implement in practice for the reasons stated above.

One study with a large sample size of 392 (Anderson *et al.* 2015) used a different measure, described by the authors as the "global response rate", that may be more easily applied in clinical practice. This demonstrated that 82% of the participants reported either a slight, moderate or marked improvements in their symptoms after an intensive 6-day programme of combined therapies. The present author proposes that this measure is tested in future studies of this population.

Randomized controlled trials are considered to be the gold standard in medical trials. However, such studies are less conclusive for physiotherapy interventions, where blinding a patient to any hands-on treatment is impossible, and the unknown effect of a therapist–patient relationship may also influence the result. A true "dose" of physiotherapy is difficult to measure with an RCT design unless a protocol is specified. The outcomes of such trials within physiotherapy studies are especially difficult to evaluate in cases of CPP, which are notoriously multifactorial. Clinical reasoning is not similar to an empirical medical model: the aim in clinical reasoning is not always to "cure" or "treat" a problem, but often to manage a condition, in combination with lifestyle changes, education and exercise, over time and perhaps the course of a therapeutic relationship.

Reporting cases who respond to treatment is another way to determine the efficacy of physiotherapy. However, pain is a biopsychosocial entity, and the outcomes described will always be subjective to each individual, making generalization of some results problematic. In addition, collecting similar participants in a sample of people with CPP is not always quick or simple.

There is wide range of scientific literature describing the biopsychosocial model of pain in chronic conditions (e.g. Bevers *et al.* 2016; Morlion & Coluzzi 2016). For this reason, the present author was surprised to find five RCTs trialling standalone physiotherapy modalities for CPP in men. Standalone treatments that may work at a physiological level exclude the psychological, sexual and social aspects of CPP. Therefore, it is understandable that MDT programmes had better functional outcomes and responses than single modalities. Treatments such as acupuncture or ESWT may still have value for physiotherapists, but are rarely carried out as standalone options. In the case of patients with CPP, outcomes from single-modality interventions treatment may be ineffective.

Up to 82% of men and women responded with improvements in overall symptoms after a 6-day MDT programme that included psychotherapy, pain education, pelvic floor manual therapy techniques and relaxation (Anderson *et al.* 2015). Brotto *et al.* (2015) used similar MDT programmes for women with vulvodynia, including pelvic floor muscle relaxation, psychotherapy and pain education. Patients reported statistically significant effect sizes for dyspareunia ($P < 0.001$). However, more research is needed to assess if this is the same in men with CPP, and in a British population.

The present author believes that the results from one large case series of moderate quality (Anderson *et al.* 2015) fit with previous research into a combined biopsychosocial MDT approach to chronic LBP that improves pain, function and the speed of any return to work (Kamper *et al.* 2014). However, these findings cannot be compared to common practice for CPP because not enough data have been reported. Nevertheless, the MDT approach is currently being used in at least three large NHS hospitals.

The seven RCTs and two case series of low to moderate quality analysed in the present literature review indicate that physiotherapy has a consistent positive effect on pain. The larger non-RCT series of moderate quality (Anderson *et al.* 2015; Brotto *et al.* 2015) also support the effectiveness of physiotherapy as part of an MDT programme. There is some moderate-quality evidence for the effectiveness of physiotherapy for

improving function in individuals with CPP who underwent an intensive 6-day MDT programme (Anderson *et al.* 2015). Only one previous systematic review of physiotherapy and CPP has been done (Haugstad *et al.* 2006, cited in Loving *et al.* 2012), and the results of this suggest that a somatosensory approach (i.e. physiotherapy combined with psychological techniques) may be beneficial. Therefore, the present author proposes that combined psychological and physiological approaches should be the focus of current clinical practice. Pain and function will arguably see greater improvements if a biopsychosocial model of pain is adopted for CPP rather than standalone treatments, which may only target the physical aspects.

Conclusions

The results of nine quantitative studies evaluating the efficacy of physiotherapy in the treatment of CPP demonstrate that this modality reduces pain and improves function. However, a true analysis of effect size was not possible because of the lack of heterogeneity in the studies. The present author has provided a statistical summary in Table 2 that presents the median and range of percentage improvements in pain and function reported in these studies. The median scores for improvements in pain and function were 23% (range = 17–39%) and 22% (range = 15.8–43%), respectively. This is difficult to interpret because of the variability in patient subgroups, study types and samples, and therefore, the large range of results, which could be overestimates.

The conclusion of the present literature review partially supports the hypothesis that MDT programmes are the most effective approach to treating pain and function. This is because the two largest clinical case series reviewed both had larger sample sizes, and used combined MDT programmes that included psychotherapy and self-management strategies. Both studies showed statistically significant responses to functional changes (Anderson *et al.* 2015, $P < 0.001$; and Brotto *et al.* 2015, $P = 0.001$). Anecdotally, this is supported by the present author's experience in clinical practice.

However, this literature review highlights the lack of empirically based RCTs for any single treatment: nine different protocols were scrutinized by researchers from six different countries. It is perhaps too early to make generalizations about physiotherapy for CPP because new modalities are still being formulated and tested around the world.

Recommendations

The present author proposes that practitioners continue to build on the evidence base by publishing case series, and recommends that a large, UK-based pragmatic clinical trial is undertaken. Comparing the results of the latter to a waiting-list control group would provide more-robust estimates of efficacy. The findings of this literature review have identified a gap between current practice and the empirical evidence base. None of the studies included were UK- or NHS-based, despite the fact that there are 11 NHS specialist CPP centres in the UK (PPSN 2020).

The present author also proposes that UK NHS-based pelvic pain centres collaborate in primary research by pooling data from patients, including details of the treatment protocols used. In this way, a nationwide collaborative pelvic pain group across NHS trusts could determine the most-effective protocols and outcome measures to support improved patient outcomes. In this author's opinion, it is possible and indeed likely that many similar approaches to those reviewed are being carried out in the UK NHS. A longitudinal study design assessing outcomes at least 12 months after treatment could produce more-rigorous and conclusive findings that would make a robust contribution to any future clinical guidance document. In turn, this could enable policy-makers to give proper consideration to costs and patient preferences.

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