Chiropractic Manipulation and Mobilisation for Postpartum Low Back Pain: A Systematic Review

By

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I, Londeka Nokulunga Phakathi, do declare that this dissertation is representative of my own work both in conception and execution

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ABSTRACT

Background: Prior research has documented empirical support for the effectiveness of chiropractic treatment for postpartum low back pain (PLBP), mostly in pregnancy but very few in postpartum. Nevertheless, the trustworthiness and calibre of the evidence from these studies has not been adequately scrutinised to authenticate their conclusions and determine whether clinical efficacy or effectiveness is present. Therefore, the objective of this study was to assess the current evidence in the literature about the therapeutic effectiveness of chiropractic manipulation and mobilisation for chronic lower back pain/pelvic girdle pain in postpartum women.

Method: This study employed a qualitative evidence synthesis methodology, specifically utilising the Cochrane systematic review strategy. The literature was sourced via an electronic literature search (e.g. Google Scholar, PubMed, Medline, ProQuest Health, etc). The key search terms used were 'low back pain', 'pelvic girdle pain' together with 'postpartum', 'chiropractic', 'manipulation', and 'mobilisation'. In addition to the key terms listed above, the search strategy for postpartum low back pain encompassed the following terms: 'post-natal mechanical low back-ache' or 'sacroiliac syndrome/dysfunction' or 'sacral subluxation' or 'sacral pain' or 'lumbopelvic' or 'lumbar facet syndrome'. For manipulation and mobilisation, the search encompassed 'sacral adjustment' or 'spinal manipulative therapy' or 'manual therapy'. A total of 2127 articles were identified, however 8 were suitable for inclusion. Data was extracted from each included study onto a prepared data extraction sheet. There were 4 reviewers that reviewed the 8 (4 RCTs and 4 CRs) articles included. The independent reviewers only reviewed the 4 RCTs. For Critical Appraisal and Quality of Evidence, Rev Man "Risk of Bias" was used tool for randomised controlled trials (RCTs) and for case reports (CRs), the Joanna Briggs Institute Critical Appraisal Tool (JBICAT) was selected was used. The GRADE (Grading of Recommendations, Assessment, Development and Evaluation) system was used to rank the evidence on various levels of clinical strength in relation to treatment outcomes.

Results: While 3 of the 4 RCTs demonstrated no significant evidence to support a superior effectiveness of chiropractic manipulation and mobilisation in postpartum low back pain, Pritchard (2001) showed statistically significant evidence in supporting the improvement chiropractic manipulation and mobilisation provided in this demographic. The outcomes in all 4 CRs showed large degrees of favourability to the effectiveness of chiropractic manipulation and mobilisation. However, the quality of the evidence was low to moderate at most, thus affecting the extent to which generalizability can be made, in to relation to postpartum low back pain.

Conclusion: This study highlighted a dearth in literature and the need for conducting research of higher quality within this demographic. There were also discrepancies in the utilisation of the LBP term and its clinical scope. It is highly important that these discrepancies are resolved by establishing a more concrete and deliberate guideline or definition of this phrase. The production of more RCTs with larger sample sizes that include a variety of demographic characteristics (race, socioeconomic status, age, etc.), was recommended.

Key terms: ‘low back pain’, ‘pelvic girdle pain’ together with ‘postpartum’, ‘chiropractic’, ‘manipulation’, and ‘mobilisation’

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DEFINITIONS

Efficacy: This study acknowledges the distinction between efficacy and effectiveness. It adopts Flay (1986) definition that conceives efficacy as a test of whether an intervention does better than harm when delivered under optimum conditions so much that any positive (or negative) effect *can be directly attributed to the intervention* being studied.

Effectiveness: This is a test of how an intervention does better than harm when delivered *under real-world conditions*. Thus, the effect of an intervention varies based on real-world conditions (Flay 1986). The focus of this study will therefore be on *effectiveness*. Efficacy will be used in reference terms only.

Manipulation is the application of high-velocity, low-amplitude manual thrust to the spinal joints slightly beyond the passive range of joint motion, which may include combined rotation and extension of the upper cervical spinal segment (Coulter et al. 1996).

Mobilisation refers to an adjustment modality that consists in the application of a controlled judiciously applied force of low velocity to the spinal joints within the passive range of joint motion that does not involve a thrust (Bronfort et al. 2004; Coulter et al. 2018).

Postpartum low back pain is defined as pain and/or discomfort localised below the costal margins and above the gluteal folds, which lasts six weeks, beginning within three months after delivery (Van Tulder et al. 2006; Kamel et al. 2016).

Pelvic Girdle pain is the pain experienced between the posterior iliac crest and the gluteal fold within the vicinity of the sacroiliac joints (Gregory & Rowell 2011). In this study, pelvic girdle pain is considered as a form of low back pain drawing on the view that conceives of pelvic girdle pain as a specific form of low back pain which can occur separately or in conjunction with low back pain (Vleeming et al. 2008).

Systematic Review refers to a study that involves identifying, synthesising, and assessing all relevant high-quality empirical evidence that meet pre-specified criteria to generate a reliable answer to a focused research question (Van Der Knap et al. 2008; Chandler & Hopewell 2013).

ABBREVIATIONS

A	ASLR	Active Straight Leg Raise
	ADL	Activities of Daily Living

	AC	Allocation Concealment
	ANOVA	Analysis of Variance
	AP	Anterior Posterior (anteroposterior)
	AAR	Dr Ashura-Abdul Rasheed- Independent Reviewer 2
B	BOA	Blinding of Outcome Assessment
	BPP	Blinding of Participants and of Personnel
C	CS	Caesarean Section
	CRs	Case Reports
	CMT	Chiropractic Manipulation Therapy
	CSE	Combined Spinal-Epidural
	CINAHL	Cumulated Index to Nursing and Allied Health Literature
D	DUT	Durban University of Technology
E	EMG	Electromyography
	EP	Epidural analgesia
	EQ-5D	EuroQol-5D
	EMBASE	Excerpt Medica Database
G	GRADE	Grading of Recommendations Assessment, Development and Evaluation
H	HVLA	High Velocity Low Amplitude
I	ICL	Index to Chiropractic Literature
	IOD	Incomplete Outcome Data
J	JBICAT	Joanna Briggs Institute Critical Appraisal Tool
L	LBP	Low Back Pain
	LPP	Lumbo-Pelvic Pain
M	MRI	Magnetic Resonance Imaging

	MoA	Memorandum of Agreement
	MOA	Mode of Action
	MSK	Musculoskeletal
N	NSAIDs	Nonsteroidal anti-inflammatory drugs
	NRS/ NPRS	Numeric Pain Rating Scale
O	OBGYN	Of Obstetrics and Gynaecology
	ODI	Oswestry Disability Index
	OPBCFs	Other Potential Biases/Confounding Factors
P	PGP	Pelvic Girdle Pain
	PPGP	Persistent Pelvic Girdle Pain
	PICO	PICO framework (Patient/Problem, Intervention, Comparison and Outcome)
	PR	Postural Restoration System
	PRS	Pierce Results System
	PP	Post-Partum
	PLBP	Postpartum Low Back Pain
	PLPP	Postpartum Lumbopelvic Pain
	PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
	PGQ	Pelvic Girdle Questionnaire
Q	QOL/QoL	Quality Of Life
R	RCT	Randomised Control Trial
	RCTs	Randomised Control Trials
	RSG	Random Sequence Generation
	RAD	Rectus abdominis diastasis
	ROB	Risk of Bias
	RW	Dr Rowan White – Independent Reviewer 1
S	SI	Sacroiliac
	SIJ	Sacroiliac Joint
	SelR	Selective Reporting
	SMT	Spinal Manipulation Therapy

SBD Stabilizer Biofeedback Device

SPSS Statistical Package for the Social Sciences

SR Systematic Review SRs Systemic Reviews

T TENS Transcutaneous Electrical Nerve Stimulation

V VAS Visual Analogue Scale

VSC Vertebral Subluxation Complex

W WHO World Health Organization

Y YT Dr Yasmeen Thandar

YLD Years Lived with Disability

1 CHAPTER ONE INTRODUCTION TO THE STUDY

1.1 Background

In line with the World Health Organisation's Millennium Development Goal 5, the National Department of Health of South Africa has committed to improving maternal health and reducing maternal and perinatal mortalities (Ngxongo, Sibiya and Gwele 2016). This is informed by medical views that pregnancy causes physiological and physical changes that expose women to various health problems. Postpartum low back pain (PLBP), a prominent case in point, is defined as pain and/or discomfort localised below the costal margins and above the gluteal folds, which lasts six weeks, beginning within three months after delivery (Van Tulder *et al.* 2006; Kamel *et al.* 2016; Weis *et al.* 2022). Postpartum low back pain leads to a debilitating burden of maternal morbidities that decrease a woman's capacity to return to a productive life after delivery (To and Wong 2003; Bergström, Persson and Mogren 2016; Weis *et al.* 2020). Between 33% and 75% of women experience PLBP of which the intensity can range from moderate to severely debilitating (Ostgaard and Andersson 1992; Breen *et al.* 1994; Bergström, Persson and Mogren 2014; Corso, Grondin, and Weis *et al.* 2020). Specific risk factors include caesarean sections and epidural injections which are exclusive to PLBP (Mogren 2007).

Clinically efficacious treatment modalities for PLBP are essential to the improvement of maternal health. In turn, this bears positive implications on the overall wellbeing of a nation by increasing the mother's ability to perform labour so as to produce economic value, which has been shown to increase GDP levels (Klobodu *et al.* 2018). Previous studies have investigated and reported evidence of the effectiveness of chiropractic care for postpartum low back pain (Bailes 1998; Gregory and Rowell 2011; Howell 2012; Fano and Mullin 2013; Kamel *et al.* 2016; Gausel *et al.* 2019). In relation to chiropractic manipulation and mobilisation in particular, a number of studies have reported similar results. Wilson (2006) has shown that manipulation reduces sacroiliac joint subluxation, which results in relief of postpartum low back pain. Similarly; Ali,

Rabea and Khudhair (2012) have reported that manipulation of the sacroiliac joint is superior to conventional treatment such as medication, rest and surgery for the management of postpartum backache. Consistent with these findings, Hoying and Alcantara (2017) and Coulter *et al.* (2018) have confirmed that manipulation and mobilisation leads to a relief of postpartum low-back pain.

Manipulation is the application of high-velocity, low-amplitude manual thrust to the spinal joints slightly beyond the passive range of joint motion, which may include combined rotation and extension of the upper cervical spinal segment (Coulter *et al.* 1996). Mobilisation, on the other hand, refers to an adjustment modality that consists of the application of a controlled judiciously applied force of low velocity to the spinal joints within the passive range of joint motion that does not involve a thrust (Bronfort *et al.* 2004; Coulter *et al.* 2018).

A systematic review approach was undertaken to evaluate and consolidate this existing evidence. As laid out in the Cochrane Handbook for Systematic Reviews of Interventions (Higgins *et al.* 2019), this approach involved identifying, synthesising, and assessing the validity of all relevant empirical evidence that meet pre-specified criteria to generate a reliable answer to a focused research question (Booth 2016; Higgins *et al.* 2019).

This systematic review constituted a clearly formulated question:

Is chiropractic manipulation and mobilisation of clinical benefit in the treatment of postpartum low back pain?

Systematic and explicit methods were used to identify, select and critically appraise relevant research from studies that met the inclusion criteria. Conclusions based on this appraisal are documented.

1.2 Research Aim

The fundamental research question that this study aimed to answer is whether chiropractic manipulation and mobilisation is clinically significant in the treatment of PLBP. The absence of an existing systematic review, on the efficacy or effectiveness of chiropractic manipulation and mobilisation for PLBP, particularly taking into account the variety of research methods, sample sizes and reporting in previous studies, sheds

light on the need to assess the validity, quality and consistency of evidence in these studies. The aim of this research was to conduct a systematic review to identify, evaluate and consolidate existing evidence on the clinical efficacy or effectiveness of chiropractic manipulation and mobilisation as beneficial modalities for PLBP.

1.3 Research Objectives

The study encompassed four objectives namely:

Objective 1: To critically appraise the risk of bias of each included study
Objective 2: To determine the quality of evidence for each main outcome in included studies.
Objective 3: To ascertain if manipulation and mobilization can be considered as beneficial treatment modalities for PLBP.
Objective 4: To make recommendations if necessary for further research regarding chiropractic care for post-partum low back pain.

1.4 Rationale for the study

Previous studies have reported evidence of the efficacy of chiropractic care for PLBP (Wilson 2006; Ali, Rabea and Khudhair 2012; Hoying and Alcantara 2017; Coulter *et al.* 2018). However, the reliability and quality of evidence of these studies had not been investigated to validate their findings and thereby establish if clinical effectiveness exists. Hence, the mandate of this research was to evaluate and consolidate existing evidence in the literature on the clinical efficacy or effectiveness of chiropractic manipulation and mobilisation for PLBP. By assessing the effectiveness or efficacy of select chiropractic treatment modalities for PLBP, this study aimed to provide clinicians with accurate current evidence for practice and inform more adequate solutions towards enhancing maternal health care. Chiropractic has been said to be similar to osteopathic interventions and physiotherapy (Weis *et al.* 2020). While this may be applicable to some degree, the paradigmatic and technical variations between all three healthcare models are distinct enough to influence their respective scopes of practice, thus potentially influencing how they uniquely approach, treat and manage their

patients (Bello 2012; van Dulmen *et al*. 2013; Gliedt *et al*. 2017; Ravidutt 2022). A gap in the literature, specifically for chiropractic manipulation and mobilization in postpartum low back was therefore identified and became a contributing rationale for this study.

1.5 Summary

This first chapter presents a summary of the literature, and indicates the area of study in this dissertation, while offering objectives, rationale, and aims behind the study.

Chapter Two consists of the literature review. This chapter is an overview of the existing literature on PLBP. It encompasses its aetiology and epidemiology, with a focus on chiropractic modalities employed to manage it.

Chapter Three consists of the methodology. Here, the focus is on the operationalisation of the research question and objectives of this study. It also describes the study's research design, details the search strategies and tests used to determine the quality of evidence.

Chapter Four consists of the findings. This part of the thesis focuses on the status of the published research on chiropractic manipulation and mobilisation as treatment modalities for PLBP. Particular attention was given to the predominant characteristics of the included studies and their quality based on a risk of bias assessment and GRADE assessment.

Chapter Five presents a critical synthesis and discussion of the findings of the research. It evaluates the quality and validity of prominent strands of evidence in previous studies and also establishes conclusions on the clinical efficacy or effectiveness of chiropractic manipulation and mobilisation for PLBP. Lastly, chapter six comprises a summary and conclusions. It also highlights the limitations of this review and puts forward recommendations.

2 CHAPTER TWO LITERATURE REVIEW

2.1 Introduction

This chapter presents the relevant literature on the discourse of low back pain as well as noting the lacuna in the available literature. The chapter explores the history of low back pain, the profile of low back pain and the factors unique to postpartum women. The World Health Organization (WHO) estimates that reproductive ill health accounts for a third of the total disease burden for women (Beksinska, Kunene and Mullick 2006, O'Sullivan *et al.* 2019). Low back pain is one of the causes/conditions of ill health in pregnancy and postpartum (Breen *et al.* 1994). There is scant literature on chiropractic care for postpartum low back pain. The mechanical and hormonal factors attributed to the prevalence of back pain during pregnancy are known, however, there is limited literature on post-partum low back pain. There have been few studies performed to determine the cause of low back pain with a number of theories having been advanced to explain the phenomena of postnatal low back pain (Ostgaard *et al.* 1992; Breen *et al.* 1994; Bergström, Persson and Morgren 2014; Corso *et al.* 2016). Globally, a significant number of females have experienced postnatal low back pain at some stage in their recovery period to a pre-pregnant state (Bhoodram 2018)

2.2 Low Back Pain

The back is comprised of the posterior aspect of the trunk, superior to the buttocks and inferior to the neck (Moore and Dalley 2018). The gluteal region extends superiorly from the iliac crests to the gluteal fold inferiorly (Moore and Dalley 2018). In light of the above anatomical definitions, low back is defined as the region between the lower margins of the 12th rib and the gluteal folds, therefore comprising of the inferior aspect of the back as well as the entire gluteal region (Galukande, Muwazi and Mugisa 2005; Maselli *et al.* 2020).

Low back pain (LBP) is regarded as the primary leading cause of years lived with disability (YLD) globally within the musculoskeletal condition group (Bhoodram 2018,

O'Sullivan *et al.* 2019; Chen *et al.* 2022). The global prevalence review of low back pain in 2008 included 165 studies from 54 countries and estimated the mean point prevalence of low back pain to be 18.3% (Maher, Underwood and Buchbinder 2017). The study outcomes revealed that low back pain (LBP) was more common in females and in those aged 40–69 years (Maher, Underwood and Buchbinder 2017). Low back pain has generally been acknowledged as highly problematic in many different countries with about 70–85% of all individuals having experienced back pain at some period in their life (Maher, Underwood and Buchbinder 2017). Additionally, the study showed that the prevalence of LBP was distinctively greater in high-income countries (30.3%), than middle-income (21.4%) or low-income (18.2%) countries, with no significant difference in prevalence between urban and rural areas (Maher, Underwood and Buchbinder 2017).

On a global scale, low back pain is the primary cause of limited activity and absenteeism from work resulting in significant economic burden on individuals, families, communities, industry and governments (Coole, Watson and Drummond 2010; Hoy *et al.* 2014; Buchbinder *et al.* 2020). Maher, Underwood and Buchbinder (2017) noted that a significant part of the population with low back pain did not seek out medical care. It was noted that those who generally seek medical care are females, individuals with a previous history of low back pain, those with poor general health and those with more disabling or extra painful episodes of low back pain (Buchbinder *et al.* 2020). It has been reported that globally, LBP causes a greater number of years lived with disability (YLD) than any other condition and that governments, health services, research providers and donors have not attributed enough attention to the burdens that LBP causes (Buchbinder *et al.* 2020). It has further been reiterated that to this end, there is need for much more advanced research to understand the predictors and clinical course of LBP better for much more enhanced prevention and management of LBP (Anderson 1999, O'Sullivan *et al.* 2019).

2.2.1 **Prevalence of Postpartum Low Back Pain**

Postpartum low back pain has been documented as far back as in the 1900s. In an observational study by Ostgaard and Anderson (1992), in which eight hundred and seventeen women had been followed through pregnancy for up to twelve months after delivery, it was noted that 67 % of women experienced low back pain directly after

delivery. At the twelve-month follow-up examination post- delivery; 37 % of the women still had some low back pain and on the 18-month follow-up examination, 7 % of the women had serious low back pain (Ostgaard and Anderson 1992).

Polden and Mantle (1990) suggested that back pain might not have been troublesome during pregnancy but that it frequently developed following childbirth. They argued that the passage of the foetus through the pelvis resulting in the ligamentous stretching and lax joints is a causative factor of low back pain. In a study done by Fraser (1976) on one hundred and fifteen postpartum women, it was noted that 95.65% of the women presented with sacroiliac torsion with associated signs of muscular imbalance. The authors explained that during pregnancy there is extensive movement of the sacroiliac joints due to relaxin, which affects the efficiency of the locking mechanism within the sacroiliac joint. After delivery, sacroiliac strain develops which results in the locking mechanism being placed in a position of rotation, leading to sacroiliac torsion.

A more recent study showed that roughly 50% of women who started off by manifesting LBP during pregnancy proceeded to have pain 1 year postnatal, with 20% remaining symptomatic 3 years postpartum (Bryndal 2020). A survey study conducted by Bergström *et al.* (2017) revealed that approximately 19% of women recalled experiencing pain to a certain degree 12 years postpartum. These outcomes were synonymous with other long-term follow-up studies of 3 and 6 years that had been conducted by Albert, Godskesen and Westergaard (2001) and Noren *et al.* (2002). Additionally, women who recalled experiencing persistent pelvic girdle pain (PPGP) for ≥30 days, within the past 12 months of when the study was conducted, were 23 times more likely to experience low back pain even 12 years postpartum (Bergström *et al.* 2017).

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In comparison to more recent studies, a cohort study in Vietnam conducted by Ha *et al.* (2019) revealed that 12.3% of the 1807 participants recalled experiencing postpartum low back pain.

According to Wiezer *et al.* (2020) postpartum pelvic girdle pain (PPGP) is a grave adversity. It influences women's quality of life (QoL) as it often compromises their daily activities of living such as weightlifting or bearing, sitting, standing and ambulation (Wiezer *et al.* 2020).

2.2.2 **Causes of Postpartum Low Back Pain**

Postpartum low back pain is a common symptom amongst women after childbirth (Bhoodram 2018). Postpartum low back is often linked to many predisposing factors. They include compensatory postural changes such as in increase in lumbar lordosis, increase in weight gain during pregnancy, weakening of abdominal musculature, and epidural anaesthesia during natural vaginal delivery as well as delivery by an emergency or elective caesarean section (MacArthur *et al.* 1990; Russell *et al.* 1993; Bjelland et al. 2013; Masuda *et al.* 2020). Other studies link postpartum low-back pain to sacroiliac dysfunction, laxity of ligaments caused by the secretion of relaxin (Wilson 2006; Gutke, Östgaard and Öberg 2008; Sipko *et al.* 2010; Tavares *et al.* 2019), and an onset of severe back pain during and/or before pregnancy (Russell, Dundas and Reynolds 1996; To and Wong 2003; Mogren 2007).

Epidural anaesthesia is increasingly administered amid labour and delivery and obstetric anaesthesiologists are therefore faced with the credence that the LBP reported by their postpartum patients is to some degree associated to the dispensation of the epidural (Bhoodram 2018).

2.2.3 **Perinatal Factors that Increase the Patient's Susceptibility to Postpartum Low Back Pain.**

2.2.3.1 Falls, Physical Compensations, Physiological Changes and Fatigue

Pregnant and postpartum women are susceptible to accidents such as falling (Mei, Gu and Fernandez 2018). It is due to the imbalance caused by hormonal and other physiological changes, coupled with the distended abdomen during pregnancy (Mei,

Gu and Fernandez 2018). As a result, this makes ambulation and other related activities, such as proprioception, quite awkward even after childbirth (Polden and Mantle 1990; Mei, Gu and Fernandez 2018). These factors, when enjoined with the psychological effects of pregnancy, have the resultant effect of making postpartum patients more susceptible to low back pain (Polden and Mantle 1990; Mei, Gu and Fernandez 2018). The predisposition to low back pain is due to the inherent adaptation methods and improvising that pregnant women may practice, in their daily activities, to be able to accommodate these factors (Polden and Mantle 1990; Mei, Gu and Fernandez 2018). The injuries from the falling itself may contribute to postpartum low back pain (Chen, Che and Su 2010; Mei, Gu and Fernandez 2018). These factors in turn cause gait and postural changes that contribute to postpartum low back pain (Polden and Mantle 1990; Mei, Gu and Fernandez 2018).

During pregnancy, women predominantly complain of lack of strength, fatigue, and emotional imbalances, which occur predominately in the first and third trimesters. According to Deering, Christopher and Heiderscheit (2020) postpartum females are prone to neuromuscular fatigue. This group of women may therefore present with afflicted motor control, thus even possibly implicating the inter recti distance and causing diastasis recti (Deering, Christopher and Heiderscheit 2020). This ultimately could cause postpartum low back pain (Deering, Christopher and Heiderscheit 2020). This link between the fatigability and strength of the inter recti distance, as well as the abdominal muscles has been further proven to be linked to postpartum urinary incontinence (Deering, Christopher and Heiderscheit 2020).

2.2.3.2 Weight Gain and Weight Gain Retention

Weight gain and anterior abdomen expansion are other factors that cause low back pain in pregnant and postpartum women (Mohamed, El-Shamy and Hamed 2018). The recommended weight gain lies anywhere between five to eighteen kilograms depending on whether the mother is obese, normal or underweight respectively (Nomura *et al.* 2017). Some women, however, gain more than the recommended weight, which correspondingly increases the compressive loading and torsional strain

on all spinal components, including the pelvic joints (Mantle 1994; Mohamed, ElShamy and Hamed 2018; Ganapathy 2021).

The overall effects are that with the increased loading of the spinal column, the normal anatomical positioning of its components is altered (Mantle, Greenwood and Currey 1977; Mohamed, El-Shamy and Hamed 2018; Ha *et al.* 2019). This leads to narrowing of intervertebral disc space and decrease in size of the intervertebral foramen. This gives rise to nerve root compression / irritation and aggravation of an existing degenerated or lesioned disc (Mantle, Greenwood and Currey 1977; Mohamed *et al.* 2018; Ha *et al.* 2019). The increase in the lumbar lordosis, combined with the gradual weight gain and possible postpartum weight gain retention, may cause the lumbar facet joints to override and traumatize the joint capsules (Mohamed *et al.* 2018; Ha *et al.* 2019, Ganapathy 2021). As a consequence, these changes may become progressive causing persistent postpartum low back (Polden and Mantle 1990; Mohamed, ElShamy and Hamed 2018; Ha *et al.* 2019).

2.2.3.3 Role of relaxin on connective tissue

Another factor that can be attributed to low back pain in pregnant and postpartum women is the effect of relaxin on connective tissue (Rostaminia, Javadiann and O'boyle 2017). Relaxin is a hormone that is secreted by the corpus luteum, and its role is to prepare the endometrium for implantation, cervical ripening, and inhibition of uterine activity during the gestation period (Mac Lennan 1981; Rostaminia, Javadiann and O'boyle 2017). The pivotal function of relaxin relates to the remodelling of connective tissue, thus leading to joint laxity in target organs to facilitate the delivery of the newborn infant (Mac Lennan 1981; Kepley, Bates and Mohiuddin 2020). The laxity of the joints is not only limited to the pelvic joints, but all joints of the body are affected to some degree (Mantle, Greenwood and Currey 1977; Kepley, Bates and Mohiuddin 2020). The mobility of the symphysis pubis increases by two and a half times (Mantle, Greenwood and Currey 1977; Kepley, Bates and Mohiuddin 2020). The changes in joint laxity are, under normal circumstances, supposed to return to their normal prepregnancy condition in about three months after delivery of the new-born infant

(Wiezer *et al.* 2020). This however may not be the case in some women thus making these women prone to postpartum low back pain (Rostaminia *et al.* 2017; Kepley *et al.* 2020; Wiezer *et al.* 2020).

2.2.3.4 Postural Changes during Pregnancy

There are significant postural changes during pregnancy that may result in the increased predisposition to low back pain and may also influence the prognosis of postpartum low back pain (Bullock, Jull and Bullock 1987; Biviá-Roig, Lisón and Sanchez-Zuriaga 2018). Generally, the postural changes are compensatory changes that occur due to the increase in weight gain, change in the body's centre of gravity and stretching or weakening of the abdominal muscles (Bullock, Jull and Bullock 1987; Krkeljas and Moss 2018; Mohamed, El-Shamy and Hamed 2018). A case control study conducted by Biviá-Roig, Lisón and Sanchez-Zuriaga (2018) demonstrated that extensor muscles of the trunk are likely succumb to the adaptive reactions caused by the added anterior weight during the perinatal period. These findings were indicated by electromyography (EMG) activity of these muscles (Biviá-Roig, Lisón and SanchezZuriaga 2018). A randomised control trial (RCT) study also reported on women with postpartum postural back pain. (Mahmoud *et al.* 2020). This postural back pain was usually combined with sacroiliac joint pain which was aggravated by prolonged sitting (Mahmoud *et al.* 2020).

In a study undertaken on seventy-five pregnant women it was shown that there were significant changes in the lumbar lordosis, thoracic kyphosis and pelvic inclination in the mid sagittal plane near the end or 'late' pregnancy, which continued up until the twelfth week of the postpartum period (Bullock, Jull and Bullock 1987). The level of relaxin during this twelve-week period was relatively high and had a considerable influence on the ligaments aiding in postural alignment (Bullock, Jull and Bullock 1987). To this end, when the normal and routine daily activities of the new mother are factored in, the altered posture tends to accentuate the existing low back pain (Mei, Gu and Fernandez 2018). Significant postural changes may be noted throughout all three trimesters of the antenatal period (Afonso *et al.* 2019). These postural changes, especially with the concomitant unresolved joint laxity, may instigate postpartum low back pain (Rostaminia et al. 2017; Biviá-Roig, Lisón and Sanchez-Zuriaga 2018).

The weight gained during pregnancy, which is in an anterior direction, places strain on the sacral prominence, which develops a compensatory altered posture in a forward and downward position, thus altering the pelvic angle (Opala-Berdzik, CieślińskaŚwider and Gnat 2019). With the change in the pelvic angle, the lumbar lordosis increases to compensate accordingly, which may override the lumbar facet joints and put strain on the sacroiliac joints (Mantle, Greenwood and Currey 1977; Biviá-Roig,

Lisón and Sanchez-Zuriaga 2018; Opala-Berdzik, Cieślińska-Świder and Gnat 2019). Bernard and Kirkaldy-Willis (1987) as well as Sharma and Ahmad (2019) have mentioned that posterior facet joint in the lumbar region and sacroiliac joint syndromes commonly co-exist, with the result of strain being placed on either the former or latter, thus causing low back pain.

2.3 Parturition Factors That May Predispose Women to Postpartum Low Back Pain.

2.3.1 **Epidural and Combined Spinal Epidural Analgesia Injections**

Combined spinal-epidural (CSE) and epidural analgesia (EP) are commonly administered to patients in labour (Grangier *et al.* 2020). The CSE analgesic provides pain relief at a quicker rate hence why it's becoming quite a popular choice (Grangier *et al.* 2020). Not only does CSE provide quicker pain relief, but it also encompasses the sacral nerve more effectively (Grangier *et al.* 2020).

According to Mahmoud *et al.* (2020) epidural analgesia administered during labour is one of the causes of postpartum back pain. Mahmoud et al. (2020) also added that the likelihood for women who've had epidural anaesthesia, to experience new consequential long-term back pain, was heightened. An RCT study described postpartum back pain as a dull pain (Mahmoud *et al.* 2020). The onset of the pain was shortly after childbirth, aggravated by exertion, with rest as a relieving factor (Mahmoud

et al. 2020). Upon examination, mild tenderness was eminent over the lumbar spine (Mahmoud *et al.* 2020).

2.3.2 **Elective and Non-elective Caesarean Section.**

According to Kazdel *et al.* (2017) a significant number of women report persistant low back pain post caesarean section (CS) with spinal under spinal anaesthesia. The retrospective study revealed that of the fifty-three participants who received spinal anaesthesia for CS, 23 patients recalled experiencing new onset back pain (Kazdel *et al.* 2017). These findings were recorded 6 months post the CS (Kazdel *et al.* 2017).

Munro *et al.* (2017) stated that a clinically significant amount women experience genitopelvic pain one year postpartum after a CS or vaginal delivery. The questionnaire study concluded that it was highly probable for patients who reported pain 2 weeks postpartum to still experience the pain 3 months later as well (Munro *et al.* 2017). Thus, suggesting a likelihood for chronic progression of the genito-pelvic pain (Munro *et al.* 2017).

A prospective study conducted in China by Wang *et al.* (2018) found that one of the risk factors for developing pain after elective CS under spinal analgesia was having previous a CS and having a larger intake of analgesics after CS.

2.4 Post-Partum Low Back Pain

In a prospective cohort study conducted in Vietnam, 12.13% of the 222 participants represented the prevalence of postpartum low back pain (PLBP) (Ha *et al.* 2019). Low back is pain that may occur between the lower margins of the 12th rib and the gluteal folds (Bhoodram 2018). In a study by Dunn *et al.* (2019) it also states that approximately 25% of postpartum women encounter postpartum lumbopelvic pain (PLPP). It also goes on to mention that postpartum lumbopelvic pain can burden women remarkably thus affecting their abilities to execute activities of daily living (ADL), mobility and their overall quality of life (QOL). Breen *et al.* (1994) describe the diagnosis of postpartum pelvic lumbar pain as pain experienced in the lumbar, lumbosacral and

sacroiliac regions. The pain may radiate to the thigh posteriorly, the perineum or groin and it may not always present within the archetypal nerve root distribution (O'Sullivan and Beales 2007). According to O'Sullivan and Beales (2007), the pathological process for PLPP is predominantly linked to alterations that occur in the circulatory system, biomechanics, neural activity as well as in the endocrine system.

Caesarean section accounts for 18.18% of patients presenting with abdominal pain, back and sacral pain. Disc bulging has also been linked to CS as well. Lumbopelvic may start from late antenatal period into two or three years postpartum. Postpartum low back pain is generally overlooked (Fitzgerald and Segal 2015: v; Mackenzie *et al*. 2018: 102-111). It's overlooked mainly because it's perceived as just a normal physiological reaction to parturition (Mackenzie *et al*. 2018: 102-111). Postpartum low back pain is also a dull pain that may occur shortly after childbirth (Mahmoud *et al.* 2020).

Amid postpartum period, the body undergoes changes in attempt to return to its prenatal state (Pereira, De Souza and Beleza 2017). According to Guerra *et al.* (2019) postpartum women need to heal mentally and physically. During postpartum period, back pain is a very common complaint, which interferes with the quality of life experienced by the new mother (Wiezer *et al.* 2020). Usually, low back pain disappears a few weeks after birth (Ostgaard and Andersson 1992; Guerra *et al.* 2019). However, some women continue to experience pain months after the birth and for some LBP presents for the first time postpartum (Ostgaard and Andersson 1992; Guerra *et al.* 2019). The back pain experienced by the new mother is not only confined to those that experienced back pain during pregnancy, but could be a result of labour, delivery and caring of the new-born infant (Polden and Mantle 1990; Deering, Christopher and Heiderscheit 2020).

Deering, Christopher and Heiderscheit (2020) elaborates on the recovery phase during postpartum period. Issues such as the management of CS aftermath; the possible perineal tearing; body mechanics influenced by childcare (including but not limited to baby feeding, cots, cars-seats); pelvic floor dysfunction (which may involve collapse of the pelvic organs); as well as LPP (lumbo-pelvic pain); are issues that need to be

addressed (Deering, Christopher and Heiderscheit 2020). The recuperation period for postpartum women usually includes the initial 12 weeks after parturition (Deering, Christopher and Heiderscheit et al 2020). However, it is also important to consider women who may have experienced complications during pregnancy and/or childbirth (Deering, Christopher and Heiderscheit 2020). In this case, recovery may proceed to be longer than 12 weeks (Deering, Christopher and Heiderscheit 2020).

Pubis separation, which is generally considered to be significant if greater than ten millimetres, is also a pathology that may give rise to PLBP (Boissonnault 2005). Postpartum women, who experience pubis separation, may become highly dependent on family members as they struggle to perform daily activities (Boissonnault 2005). These activites may include movements such as climbing out of bed to ambulation, especially immediately postpartum (Boissonnault 2005). Their dependence may endure for three to six months postpartum (Boissonnault 2005).

Rectus abdominis diastasis (RAD), which is the parting of muscle bundles down the linea alba, may also be associated with PLBP (Alamer, Kahsay and Ravichandran 2019). It may contribute to the distended, saggy, untoned abdomen phenotype commonly observed in postpartum women (Alamer, Kahsay and Ravichandran 2019). According to Alamer, Kahsay and Ravichandran (2019), 90% of mothers encounter RAD worldwide. RAD compromises posture, and because of the decrease in its function and strength, it causes added strain to the back (Alamer, Kahsay and Ravichandran 2019). Postpartum low back pain is therefore inevitably triggered (Alamer, Kahsay and Ravichandran 2019).

Wiezer *et al.* (2020) explains how pelvic girdle pain and pregnancy related low back pain are grouped as one and referred to as lumbopelvic pain. Wiezer *et al.* (2020) goes on to say that pelvic girdle pain includes locations such as the low back, buttocks, symphysis pubis, the groin and the sacroiliac joint (SIJ) on one or both sides. It's of utmost importance to note that these are the same anatomical regions that Moore and Dalley (2018) refer to when they relate to the low back. O'Sullivan and Beales (2007) also defined postpartum low back pain by referring to the very same structures. Studies have shown that women may suffer from persistent pelvic girdle pain (PPGP), thus

including persistent low back pain (Bergström *et al.* 2017; Sakamoto and Gamada 2019). The PPGP may occur and persist anywhere between 6 months to 11 years after delivery, thus suggesting that a spontaneous recovery, without recurrences, seems like an unlikely clinical course for a subgroup of women (Bergström *et al.* 2017; Sakamoto and Gamada 2019). While some women may only encounter mild pain, 13% endure moderate pain and 7% may present with severe postpartum PPGP (Bergström *et al.* 2017). In addition, severity of symptoms appears to vary over time (Bergström *et al.* 2017; Sakamoto and Gamada 2019). Most women with PPGP report a continuous dull pain, however, some women experience more intense pain such as sharp and stabbing sensations (Bergström et al. 2017; Breen *et al.* 1994).

Most antenatal education ends with the birth of the new-born (Guerra *et al.* 2019; Deering, Christopher and Heiderscheit 2020). Hence many postnatal women are unprepared for the changes, both physically and psychologically, in the postnatal period (Guerra *et al.* 2019; Deering, Christopher and Heiderscheit 2020). The new mother will now be required to make the transition from pregnant woman to a responsible mother, who must be able to care for the new-born, doing daily lifting, breast feeding and changing of nappies (Guerra *et al.* 2019; Deering, Christopher and Heiderscheit 2020). The mother's sleep cycle is disturbed, which brings upon fatigue and tiredness, all of which will lead to the recurrence of the existing low back pain (Nijs *et al.* 2017; Guerra *et al.* 2019; Deering, Christopher and Heiderscheit 2020). Looking at the postnatal period from a broader perspective, the following factors could play a role in the progression of low back pain: heavy enlarged breasts, swollen and aching legs, mood (postnatal depression) and increasing demands made by either the newborn infant, other children or life partner (Polden and Mantle 1990; Awad and Allah 2019). It is important to know that during the initial weeks into the postpartum period, the new mother's interest in herself is very small and her concentration span is shorter, which places her in considerable risk of aggravating or developing postpartum low back pain, especially if accentuated by further perpetuating factors. The elevated risk is due to the possible neglect of the of early PLBP thus progressing it to a more persistent PLBP with that has little to no resolve (Mantle, Greenwood and Currey 1977; Bergström *et al.* 2017; Guerra *et al.* 2019).

PLBP is a common painful disorder among those who've encountered childbirth (Li *et al.* 2018). It's a severe condition which may even progress to prolonged postpartum pain and disability (Li *et al.* 2018). Nonsteroidal anti-inflammatory drugs (NSAIDs) are the primary and most commonly used treatment for low back pain (Li *et al.* 2018). However, NSAIDs are unhealthy for babies amid their breastfeeding term (Li *et al.* 2018). Prolonged use of NSAIDs also pose elevated cardiovascular risks (Li *et al.* 2018). Nonpharmacological modalities largely referred to as alternative therapy, such as physical therapy and acupuncture, are popular interventions (Li *et al.* 2018). Neuromuscular electrical stimulation has also been considered when referring to nonpharmacological interventions, however information regarding the use of neuromuscular electrical stimulation for PLBP is quite limited (Li *et al.* 2018) Dry cupping may also be used for PLBP as the suction it produces aims to elevate the local blood and lymphatics circulation to alleviate painful tension in the muscles (Yazdanpanahi *et al.* 2017). Monitored exercises may also serve as a therapeutic modality which particularly aims to strengthen and stabilize global and local muscles implicated with LPP (Unsgaard-Tøndel *et al.* 2016). Chiropractic Manual treatment modalities such as spinal mobilization is also one way of soughting out relief from PLBP (Kamel *et al.* 2016). According to Kamel *et al* (2016); and Franke *et al.* (2017), it's able to some degree of relief not just from PLBP, but also impacts functional disabilities. Spinal manipulation is also a specialized modality of treatment which is a non-invasive, manual technique that also provides relief from musculoskeletal (MSK) pain and helps improve disability (Gyer *et al.* 2019).

2.5 Manipulation and Mobilization as Treatment for Postpartum Low Back Pain

Manipulation is a manual procedure that involves a directed thrust to move a joint past the physiological range of motion without exceeding its anatomic limit (Gatterman 1995; Kranenburg *et al.* 2017; Carpino *et al.* 2020). Spinal manipulation offers mothers a drug free treatment for postnatal mechanical low back pain, which does not interfere with the nurturing of the new-born infant. Drugs such as NSAIDs, antibiotics and

analgesics are contra-indicated for use in the postnatal period as they produce unwanted side effects (Klein 1996; Li *et al.* 2018).

There are two main thought processes pertaining to how spinal manipulation therapy (SMT) functions to provide relief- they are neurophysiological and/or biomechanical. The biomechanical mode of action (MOA) proposes that the SMT will affect a manipulable functional spinal injury or disorder (Rubinstein *et al.* 2019). Thus, the purpose of SMT is to decrease and improve internal mechanical strain or tension. The neurophysiological MOA proposes that afferent neurons of the paraspinal tissues are affected by the SMT, as well the pain processing and motor control systems. While there are disputes on the effectiveness and validity of chiropractic treatment, including manipulation and mobilization (Goncalves, Scanff and Leboeuf-Yde 2018; Grace,

Engel and Jalsion 2018), there are evidence that suggests and supports its effectiveness (Bergström, Persson and Mogren 2016; Bernard and Tuchin 2016; Weis *et al.* 2020).

It was noted by Bernard and Tuchin 2016; Rubinstein *et al.* (2019); and Weis *et al.* (2020) that spinal manipulation is utilized not to increase movement, but to restore normal joint alignment. During the antenatal period, hormonally induced hypermobility occurring within the sacroiliac joints causes joint subluxation (Bernard and Tuchin 2016; Rubinstein *et al.* (2019); Deering, Christopher and Heiderscheit 2020; Weis *et al.* 2020). Subluxation of the sacroiliac joint compromises the normal locking mechanism of the joint and pain is a result of unusual tension and stresses imposed on the sacroiliac ligaments (Bernard and Tuchin 2016; Rubinstein *et al.* 2019; Deering, Christopher and Heiderscheit 2020; Weis *et al.* 2020). After childbirth, the ligaments normally retighten, and the locking mechanism of the sacroiliac joints becomes more effective (Bernard and Tuchin 2016; Rubinstein *et al.* 2019; Deering, Christopher and Heiderscheit 2020; Weis *et al.* 2020). However, in some cases, the locking mechanism occurs in the position of rotation of the hip bones that occurs during pregnancy, with the possibility of recurrent sacroiliac joint subluxations (Bernard and Tuchin 2016; Rubinstein *et al.* 2019; Deering, Christopher and Heiderscheit 2020; Weis *et al.* 2020). The manipulative reduction of the sacroiliac joint subluxation results in the locking mechanism of the joint becoming more effective, thus relieving the strain on the

ligaments around the joint (Bernard and Tuchin 2016; Rubinstein *et al.* 2019; Deering, Christopher and Heiderscheit 2020; Weis *et al.* 2020). The hormonally mediated joint laxity is not limited to the sacroiliac joints. There is also an increase in general joint laxity throughout the musculoskeletal system, and it may take up to six months postnatally for joint laxity to regress to its pre-pregnancy state (Polden and Mantle 1990; Awad and Allah 2019)

While some studies may argue the effectiveness and/or safety of spinal manipulative therapy (Puentedura and Louw 2012; Biller *et al.* 2014; Kranenburg *et al.* 2017), others conclude that it is a safe therapeutic approach, that offers the patient more immediate relief than any other form of conservative treatment (Bronfort *et al.* 2004; Corso, Grondin and Weis 2016; Bhoodram 2018; Gausel *et al.* 2019; Weis *et al.* 2020). Meade *et al.* (1995) stated that in their study, which involved comparing hospital outpatient treatment to chiropractic treatment in managing mechanical low back pain, chiropractic treatment was the more effective of the two treatments. In the three 'year follow-up, patients who received chiropractic care derived more benefit and long-term satisfaction, especially in decreased pain intensity, than those treated by hospitals. However, Starzec and Truszczyńska (2017) argue that postpartum lumbopelvic pain needs customized and compounded treatment. According to Starzec and Truszczyńska (2017), there isn't one superiorly potent treatment method. An amalgamation of technique or modalities, which are evidence-based, results in the superlative treatment outcome (Starzec and Truszczyńska 2017).

According to Hertzog, Vernon and Rypma (1993) and Rubinstein *et al.* (2019), other benefits of spinal manipulative therapy such as the release of anti-inflammatory cytokines and the increase in joint motion are directly associated with the magnitude of the treatment force. Panzer, Bandinelli and Hallet (1995) as well as Anderst *et al* (2018) suggests that spinal manipulation directed to a facet articulation is the treatment of choice in facet syndrome. The effects which occur in the facet joint due to manipulation include the release entrapped meniscoids; reduction of articular cartilage displacement; pain relief by co-activation of various receptors reduce weight bearing especially on compensating joints; reduce intracapsular and extracapsular adhesions;

relief of abnormal tension on the joint capsule and the release of osseous mechanical locking (Panzer, Bandinelli and Hallet 1995; Anderst *et al.* 2018).

Bronfort *et al*. (2014) and Thomas *et al*. (2020) defined mobilization as the application of manual force to the spinal joints within the passive range of joint motion that does not involve a thrust. Spinal mobilization is a gentler approach to spinal treatment which focuses on restoring joint movement and range (Bronfort *et al*. 2014; Driehuis *et al.* 2019) It uses slow movements of the joints until it reaches the endpoint of its range to gradually reduce the tension, unlike the sudden force used during spinal manipulation (Bronfort *et al.* 2014 and Driehuis *et al.* 2019). The goal of spinal mobilization is the same as high velocity low amplitude (HVLA) spinal manipulation - to restore or to enhance joint function (Bronfort *et al.* 2014 and Driehuis *et al.* 2019). However, unlike HVLA spinal manipulation, slow movement, usually to a firm endpoint of joint movement, is used to mobilize the joint (Bronfort *et al.* 2014 and Driehuis *et al.* 2019).

2.6 Conclusion

Other studies reveal caveats despite their reported positive results about the efficacy of chiropractic care for postpartum low back pain (Gregory and Rowell 2011; Ali, Rabea and Khudhair 2012). Both studies have reported that chiropractic manipulation led to a relief of postpartum low back pain. In both studies, high-velocity low amplitude thrust techniques of manipulation were used. To quantify the effect of the treatment, Ali et al. used an objective measuring tool (the visual-analog scale) while Gregory and Rowell (2011) relied on the patients' subjective presentation. In the latter case, the patient reported a complete resolution of the pain but on a follow up visit after 18 days, the pain had returned. Similarly, in the study by Ali, Rabea and Khudhair (2012), 3 out of six patients had immediate total relief of pain with one who had a recurrence after 21 days.

Such findings point to a need for a systematic scrutiny of the quality and validity of evidence in these studies. This would be crucial to reconcile uncertainties that may arise from such disparate findings and their implications on a definitive statement regarding the clinical effectiveness of chiropractic modalities as treatment for

postpartum low back pain. A systematic review (SR) befits such purposes. From their inception in the 1970s, systemic reviews have been used to examine the efficacy of health care interventions in order to support evidence-based medicine (Boaz, Ashby and Young 2002; Lichtenstein, Yetley and Lau 2008). According to Siddaway, Wood and Hedges (2018), a systematic review is able to answer much broader questions than a single empirical study can, which gives it greater potential to provide important practical implications. For the purposes of this research, the systematic review method was selected because it is also considered as one of highest forms of research that can provide the most reliable implications for evidence-based practice and policy (Mallet *et al.* 2012). The proposed SR has a potential to generate findings that can inform the search for more adequate solutions to problems pertaining to maternal health in South Africa and internationally.

Moreover, an initial scoping of the literature yielded no result on previously published systematic reviews to assess the clinical effectiveness of chiropractic manipulation and mobilisation for postpartum low back pain. There is one notable review conducted by Coulter *et al.* (2018) which evaluates the efficacy, effectiveness, and safety of chiropractic manipulation and mobilisation for treating *chronic low back pain*. However, this review makes miniscule reference to *postpartum* low back pain which is differentiated from general low back pain in the population. This opens up a gap for this study, of which the overriding position is that postpartum low back pain presents great adversity to maternal health.

By and large, studies have shown that LBP is a multi-factorial condition with various aetiologies. The impact of LBP on the general population indicates that this condition is one of the most common, debilitating, musculoskeletal problems. The significance of LBP amongst postpartum women is evident in the numerous studies attempting to isolate risk factors. Manipulation and mobilization have evolved as methods that actively aid in the management of postpartum low back pain.

3 CHAPTER THREE METHODOLOGY

Introduction

This chapter explains the methods and materials used during the study and the methodology used to analyse the data. This chapter therefore discusses study design, data collection methods (literary search, study selection identification, inclusion/exclusion criteria) and analysis (studies assessment and finding summaries) Cook, Sackett and Spitzer's (1995), and ethical considerations. , This chapter was also synthesized in line with Liberati *et al.* (2009); Cook, Sackett and Spitzer's (1995), Greenhalgh and Peacock, (2005) and C.A Weis *et al.* (2020).

3.1 Study Design

This research used a qualitative paradigm using the Cochrane systematic review approach. As laid out in the Cochrane Handbook for Systematic Reviews of Interventions (Higgins *et al.* 2019), this approach involved identifying, synthesising, and assessing the validity of all relevant empirical evidence that met pre-specified criteria so that a reliable answer to a focused research question could be generated (Booth 2016; Higgins *et al.* 2019). From their inception in the 1970s, systemic reviews (SRs) have been used to examine the efficacy of health care interventions in order to support evidence-based medicine (Boaz, Ashby and Young 2002; Lichtenstein, Yetley and Lau 2008). According to Siddaway, Wood and Hedges (2018), a systematic review (SR) is able to answer much broader questions than a single empirical study can, which gives it greater potential to provide important practical implications.

For the purposes of this research, the SR method was selected because it is also considered as one of highest forms of research that can provide the most reliable implications for evidence-based practice and policy (Mallet *et al.* 2012). This SR has generated findings that can potentially inform more adequate solutions to problems pertaining to maternal health in South Africa and internationally.

The PICO framework (Patient/Problem, Intervention, Comparison and Outcome) was used to generate a focused research for this study, thereby identifying the key concepts for an effective search strategy (Schardt *et al.* 2007; Siddaway, Wood and Hedges 2018), the research question was what informed the selection of key terms that was

used for the search across the various electronic databases. Furthermore, it provided a framework for the operationalisation of the research question and helped to focus the discussion of the results.

Table 3-1 Illustration of the PICO framework for this research

P	Health Problem / Population - Postpartum low back pain regardless of natural birth or via caesarean section
I	Intervention - Chiropractic manipulation and mobilisation, must be specific to chiropractic
C	Comparisons- -NSAIDS, activity modification, bracing, adjunctive modalities, etc.
O	Outcome - Clinical efficacy or effectiveness in the resolution of postpartum low back pain

3.2 Permissions

The main research activities followed after the approval from the Faculty Research Committee at the Durban University of Technology. A Memorandum of Agreement (MoA) between the researcher and the independent reviewers was sought (Appendix G).

3.3 Study Procedure

3.3.1 **Assessment of the Available Literature**

To arrive at the research question, the researcher initially conducted a scoping of the literature to establish what had been published, to date, on the efficacy or effectiveness of chiropractic manipulation and mobilisation for postpartum low back pain. The scoping yielded a variety of studies which were largely case reports and case control studies with some randomised control trials, cohort studies, and cross-sectional studies. It must be noted that the scoping review of the literature yielded no published systematic reviews on chiropractic manipulation and mobilization in postpartum low back pain.

3.3.2 **Data collection: literature search and study selection**

The data collection was facilitated by a set of search terms drawing upon the PICO framework (Siddaway, Wood and Hedges 2018). The key search terms used were ‘low back pain’, ‘pelvic girdle pain’ together with ‘postpartum’, ‘chiropractic’, ‘manipulation’, and ‘mobilisation’. These terms were used to optimise search results. In addition to the key terms listed above, the search strategy for postpartum low back pain encompassed the following terms: ‘post-natal mechanical low back-ache’ or ‘sacroiliac syndrome/dysfunction’ or ‘sacral subluxation’ or ‘sacral pain’ or ‘lumbo-pelvic’ or ‘lumbar facet syndrome’. For manipulation and mobilisation, the search encompassed ‘sacral adjustment’ or ‘spinal manipulative therapy’ or ‘manual therapy’.

The following inclusion and exclusion criteria were employed in order to select the appropriate data required to answer the research question:

Is chiropractic manipulation and mobilisation of clinical benefit in the treatment of postpartum low back pain?

The inclusion criteria pertained published randomised control trials, non-randomised control trials, case series and case reports. Grey literature which complied with the above study designs (in order to avoid publication bias) e.g. doctoral dissertations and conference papers, was also included. All studies were to be in English to avoid misinterpretation and ambiguity (Cormier 2017; Walpole 2019: 127-134; Nasri, Nasri and Talib 2021: 15-28). All studies in the above categories were to focus on Chiropractic manipulation and/or mobilisation as intervention(s) for postpartum low back pain; the relief of postpartum pelvic girdle pain under chiropractic manipulation and/or mobilisation; Chiropractic manipulation and/or mobilisation of the sacroiliac joint in postpartum patients; as well as the clinical outcomes of chiropractic manipulation and/or mobilisation of the low back in the postpartum patient.

The exclusion criteria excluded any study related to low back and pelvic girdle pain during pregnancy; any study related to an intervention other than manipulation and mobilisation; studies involving manipulation and/or mobilisation not specific to

chiropractic; interviews, surveys, cohort studies and case-control studies; studies on animal subjects; non-English articles; as well as any study that does not meet any of the inclusion criterion.

3.3.3 **Data sources and search strategy**

3.3.3.1 Data Sources

Published work was located by the researcher by employing the following electronic databases: Google Scholar, PubMed, Medline, ProQuest Health and Medical Complete, EBSCO (CINAHL), Cochrane Library, Cochrane Central Register of Controlled Trials (CENTRAL) and Index to Chiropractic Literature (ICL). For grey literature the search focused on doctoral dissertations and conference papers. Google, Google Scholar and Open-Access Repositories were the electronic databases of choice for the location of grey literature.

3.3.3.2 Data Collection Process

Data were collected using the method demonstrated in the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram (Figure 41) (Moher et al. 2009). Endnote was the reference manager used for the recording all citations including their attached abstracts obtained through each database search. Once all searches were complete across all databases, duplications were removed, and the numbers recorded. Each citation (together with their abstract) was then be screened by the researcher to determine if they met the study's inclusion criteria. If any ambiguities existed at this stage, the researcher sought guidance from the study's supervisors. Exclusions were made, and the numbers recorded together with reasons for exclusion. In cases where exclusions cannot be made by reading the abstract only, full-text articles were sought. At this stage, full-text articles were sought for all remaining citations. Further exclusions were made where necessary, after reading the full-text versions. A hand-search of all references in the remaining full-text articles was conducted to determine if any other articles were missed in the literature search. The Full-text versions were sought for missed articles and included amongst the records when appropriate. Full-text articles were sought directly online or via the Endnote online full-text finding function. In cases where full-text versions could not be found

through these methods, assistance was sought from the post-graduate librarian at DUT and through inter-library loans.

3.3.3.3 Data Extraction

Data was extracted from each included study onto a prepared data extraction sheet (Appendix E). The data extraction sheet included variables appropriate to the types of studies included in the SR. Examples of variables were the intervention, control, number and age of participants, study duration, study design, outcome measures, dropouts, follow-ups, adverse effects, and diagnostic criteria.

3.3.3.4 Data Analysis and Synthesis

Critical Appraisal and Quality of Evidence Tools

Primary data analysis focused on the validity and risk of bias; as well as the analysis of the strengths and weaknesses of included articles/studies. This was done using specific critical appraisal tools. For randomised controlled trials (RCTs), the researcher used the RevMan "Risk of Bias" tool (Higgins *et al.* 2011) (Table 4-2); for case reports and case series, the Joanna Briggs Institute Critical Appraisal Tool (JBICAT) for Case Reports was selected was used (Moola *et al.* 2017) (Appendix C1-C8).

Following critical appraisal, the quality of the evidence was analysed for each paper. The GRADE (Grading of Recommendations, Assessment, Development and Evaluation) (Table 4-3) system was used to rank the evidence on various levels of clinical strength in relation to particular treatment outcomes. In each study, the level of evidence of specific outcomes for each modality (chiropractic manipulation and mobilisation) was ranked according to the GRADE certainty ratings of high, moderate, low and very low based on inconsistency, indirectness, imprecision, risk of bias, and publication bias that was present (Brożek *et al.* 2011; Dijkers 2013; Coulter *et al.* 2018).

The Review Process

A minimum of two independent reviewers are recommended for systematic review data extraction and quality assessment (Charrois 2015). The researcher therefore identified two eligible independent reviewers. Both reviewers were blinded so that possible interreviewer discussion and assessment bias could be avoided. Reviewers selected

had both obtained a postgraduate qualification in the field of Chiropractic and they also had a combination of clinical, research and academic experience or expertise. Reviewers were allocated 3 weeks for the reviewing of articles.

Two of the appointed reviewers were each emailed a Memorandum of Agreement (MoA) between the researcher and the reviewer (Appendix G). The MoA included the study information, the procedure of the review process, the expected duties of the reviewer, remuneration benefits for the reviewer as well as the contact details of the study's supervisors. Electronic PDF copies of the articles (Appendix F1-F8) that required reviewing were emailed to the respective reviewers. A prepared standardised data extraction sheet (Appendix E- RW and Appendix E- AAR) was also emailed to the reviewers, which ensured that the two reviewers collected the same information for each study, thus eliminating any discrepancies that may have occurred. The critical appraisal tools chosen for each study type was also provided to the reviewers. The researcher conducted an independent review of each study and hence did not view the feedback from the other reviewers until the researcher's independent review had been completed

3.4 Ethical considerations

This was a systematic review, which did not involve any risk to human participants. It was thus exempt from ethics clearance. Reviewers signed a Memorandum of Agreement (Appendix G) which confers to them autonomy, justice, beneficence and non-maleficence. For purposes of good ethical practices, both the researcher and the reviewers committed to meeting all previously agreed upon deadlines. However, due to unforeseen circumstances amongst both parties, deadlines were missed, and an extension was provided and a mutually agreed upon adjusted timeline was drawn.

3.5 Conclusion

Results from each reviewer as well as the researcher was collated and the results of the risk of bias of each study were summarised and documented under appropriate groupings determined once data extraction was completed e.g. mobilisation, manipulation and type of back pain.

The researcher conducted an independent analysis of the quality of evidence with regards to specific outcomes in each study using the GRADE system (Dijkers 2013). This was summarized in a Summary of Findings, Table 4-3. Based on all the evidence presented, the researcher discussed the strength of the evidence in answering the research question in Chapter 4. Limitations were discussed, and recommendations were made.

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) 2009 Checklist (Appendix B) was used as a guide for reporting all information which included results and discussion (Moher *et al.* 2009).

4 CHAPTER FOUR RESULTS

4.1 Literature Search

This literature search aims to report how the articles in this systematic review were searched, screened and further screened for eligibility to be included in the systematic review. Figure 4-1 is the Prisma Flow Diagram which documents the searching, identification and screening process that generated the final articles selected for this review. A total of 4311 related studies were identified from the initial searching process, of which 4308 were database results and 3 were identified through the Durban University of Technology (DUT) repository and subsequently accessed on shelf, at the DUT Alan Pittendrigh Library. Of the databases searched, PubMed yielded 41 records, Medline generated 257 records, ProQuest resulted in 3606 records, Cochrane Central Register of Controlled Trials (CENTRAL) rendered 25 records, Google Scholar provided 102 records, Cumulated Index to Nursing and Allied Health Literature (CINAHL) yielded 260 records and Index to Chiropractic Literature (ICL) resulted in 17 records.

Thereafter, duplicates were removed from all retrieved records and the balance of records were screened. Records after duplicates were removed, resulted in 2127 studies. Subsequently, the title and abstract of each article was screened to determine if they met the inclusion criteria. A total of 2039 articles were excluded at this stage of the screening process. Exclusions were due to the following: 529 records were chiropractic manipulation and mobilisation for low back pain “during pregnancy”, 62 studies were interventions irrelevant to the inclusion criteria (e.g. rehabilitation, massage, etc.) and 1077 papers were not specific to chiropractic. Furthermore, a total of 156 were either qualitative studies (interviews), cohort studies, cross sectional studies, focus groups, descriptive surveys, case control or systematic reviews and were therefore also excluded. Another 178 studies were excluded because they did not meet any inclusion criterion and 37 more records were excluded due to them being reported in languages other than English. This resulted in 2039 excluded records, leaving a total of 88 records for further screening for eligibility.

The eligibility of the balance of 88 records for inclusion into the systematic review was established by assessing the full-text of each. The full-text assessment enabled further

detection of inclusion and exclusion factors, subsequently resulting in a further 81 exclusions. These exclusions were due to the following: 2 records were found to have been translated from another language and were excluded on the basis of potential inaccuracy of reports in the translation process; 21 records were excluded because they focused more on complementary and alternative medicine; and 14 other records were excluded because they studied non-chiropractic specific manipulation (e.g. osteopathic and physiotherapy related manipulation). Other ineligible records were 4 systematic reviews (with different inclusion criteria to the current study); 1 study which had insufficient information; 27 records which had no intervention discussed; as well as 9 records that were not related to postpartum low back pain. A hand search was also conducted from the excluded SRs and 4 potential records were detected. These 3 of the 4 records were excluded because they also were not specific to Chiropractic after screening their full texts. This brought the total to 17 records that weren't specific to Chiropractic. The remaining 1 study was considered for inclusion as it met the inclusion criteria. A total of 81 more studies were thus ineligible and therefore also excluded from this systematic review.

Initial searches for all studies were conducted between October 2021 and November 2021. Only studies conducted up until 20 years prior were considered. A subsequent search was conducted in January 2023 to determine if any new studies were eligible for inclusion. No additional studies that met the inclusion criteria were found. Once all was taken into consideration a total of 8 studies were included in this systematic review. Of these 8 studies, 4 were randomised control trials (RCTs) and 4 were case reports (CRs).

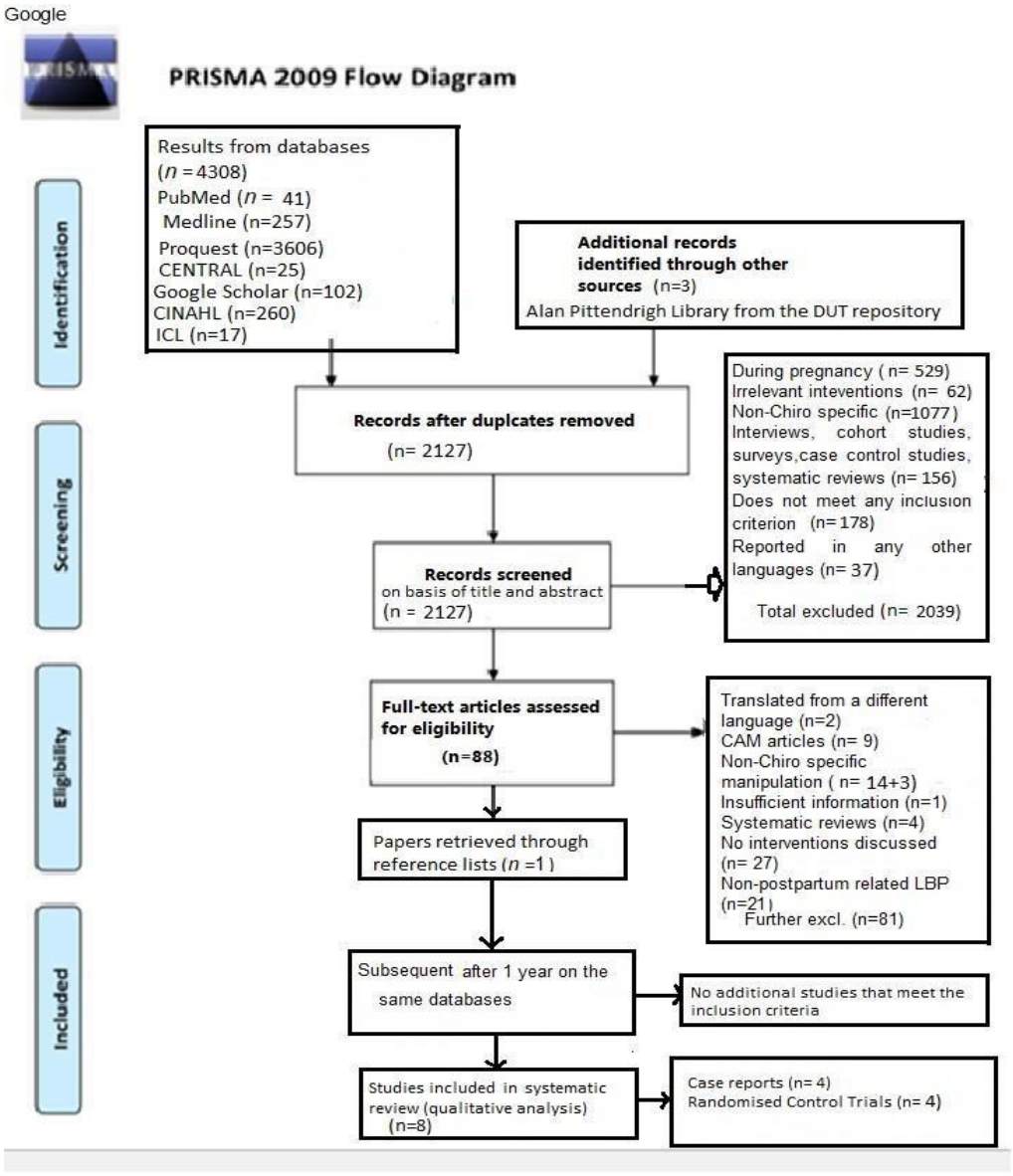

Figure 4-1 PRISMA Flow Diagram

Each of the final 8 studies retrieved underwent a risk of bias and quality assessment. The 4 RCTs were assessed for risk of bias using the Rev Man Risk of Bias Assessment (Higgins et.al. 2023) and for certainty of evidence; using the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) analysis tool (Guyatt et al. 2008: 924-926). The 4 case reports were analysed using the Joanna Briggs Institute critical appraisal tool (JBICAT) (Moola *et al.* 2017).

4.2 Data Extraction

Data extraction was conducted using a structured table to systematically collect and record pertinent information from the selected studies. This process was carried out independently by the primary reviewer, LP and two other independent reviewers, RW, and AR, ensuring the reliability and consistency of the extracted data. The primary researcher, LP, compiled the main Data Extraction Table, "Table 4-1", which serves as the primary repository for the collected data. Additionally, the data extraction conducted by RW and AAR resulted in which resulted in separate data extraction sheets. These sheets are included as appendices, "Appendices E-RW to EAAR". This approach to data extraction strengthens the rigor of the review and allows for cross-validation of the extracted data, thereby contributing to the reliability of the review findings.

Table 4-1 Data Extraction Table

Randomised Control Studies

Study; location	Intervention	Comparison	No. and age of participants; duration of study	Study design	Outcome measures	Dropouts, adverse effects	Outcome	Diagnostic criteria	Notes
Adding Chiropractic Treatment to Individual Rehabilitation for Persistent Pelvic Girdle Pain 3 to 6 Months After Delivery: A Pilot Randomized Trial Anne M. Gausel, 2019	Treatment included soft tissue treatment, manipulation, and + advice (individualised) + Rehabilitative training sessions + home exercise programme 3xweek (6 women)	Individualise d rehabilitation only Rehabilitative training sessions + home exercise programme 3xweek (5 women)	11 women 31.8 years average Maximum number of consultations to be 12 over the course of the intervention's 20 weeks. A maximum of 10 rehabilitation training sessions with another chiropractor (I.K.) were made available to the female participants in both groups. The women also	A Randomized Trial (Pilot)	Primary outcome measure - Oswestry disability index (ODI) (rated by patient in questionnaire) secondary outcome measures Orthopaedic tests ASLR and P4, Pain (NRS	No dropouts from the 11 women who participate d in the pilot randomise d trial 3 women in the treatment group reported temporary tenderness because of the last treatment	Both groups reported improved in disability and pain but not in general health status (20 weeks later) Women with pain in the symphysis recovered faster than women with pain in all 3 pelvic joints. ***Chiropractic and Rehabilitation*** *Group:* **ODI** - Mean Change (95% CI)--7.3 (-21.0 to 6.3)	By Albert et al as "everyday pain from one sacroiliac joint alone, verified by objective results. Because the affected women frequently have difficulty distinguishing between lumbar pain and PP, we also included women who had secondary lumbar pain	Tx group were more physically active during and before pregnancy Higher degree of disability (ODI), more pain (NRS), more pelvic pain symptoms (PGQ) and lower general health

Stavanger University Hospital, *Stavanger, Norway.*			received a regimen with exercises to practise at least three times weekly at home.		patient), pelvic pain (PGQ patient), and quality of life (EQ-5D patient).		**P4 and ASLR-** -1.5 (-2.4 to -0.6) **NRS average –** -2.3 (-4.9 to 0.4) **PGQ-** -10.2 (-31.1 to 11.1) **EQ-5D –** -2.4 (-4.7 to -0.1)		status (EQ- 5D) Small subgroup of 1-sided PGP out of 5 PGP subgroups
Study; location	Intervention	Comparison	No. and age of participants; duration of study	Study design	Outcome measures	Dropouts, adverse effects	Outcome	Diagnostic criteria	Notes
A Study to Determine the Effectiveness of Chiropractic Manipulative Therapy of the Sacroiliac Joint and Pelvic Stabilisation Exercises in the Management of Post-Partum	Group 3: Diversified CMT and Slow Dynamic Strengthening Exercises of Gluteus Medius Piriformis and Psoas Muscles together	Group 1: Diversified CMT only Group 2: Slow Dynamic Strengthening Exercises of Gluteus Medius, Piriformis and Psoas Muscles Can these be regarded as controls?	30 participants divided into 3 groups of 10 individuals 18-50 years Treated six times in a period of three weeks, with two treatments per week	Randomised trial	Objective measures Modified Schober's test Subjective measures Oswestry Low Back Pain and Disability Questionnaire- is a ten sectioned questionnaire, with each section having six options.	N/A	**Modified Schober's Test (Intra-group)** Normalisation of aberrant joint function and muscle strengthening is considered the most effective way to reduced low back pain in patients. Subjective results **Numerical Pain Rating Scale (Intra-group)**	No Formal diagnostic criteria was mentioned. Patients had to be at least 3 months postpartum and present with low back at initial consultation	

Lower Back Pain, Rosenberg 2005 *University of Johannesburg, South Africa*		Or are there 3 interventions?			Each option is given a point rating of between zero and six. The most severe pain and disability option rates at six points and the least severe at zero points with the remaining options rating from one to five points in severity. Numerical Pain Rating Scale- blocks labelled 0 to 10		Group 1 and group 3 who received Sacroiliac adjustments responded better than group 2 who received only core stabilisation exercises. G1- 33% G2 – 27% G3- 32,50% Objectively, on Modified Schober's Test intra -group analysis group 3 responded the best. G1- 0,35cm G2- 0.65cm G3 – 1,65cm **Oswestry Lower Back Pain and Disability Questionnaire (Intra-group)**		

							Group 3 responded the best with an overall reduction in the mean percentage pain and disability from visit 1 to visit 6 Subjectively from visit 1 to visit 6 there was an overall improvement of group 3's mean percentage pain and disability G1- 9,80% G2- 14,60% G3- 16,40% No statistically significant differences could be noted on intergroup analysis, for NPRS and disability for the Oswestry Low Back Pain and		

							Disability Questionnaire. (P>0.05)		

Study; location	Intervention	Comparison	No. and age of participants; duration of study	Study design	Outcome measures	Dropouts, adverse effects	Outcome	Diagnostic criteria	Notes

The Relative Effectiveness of Spinal Manipulation in Conjunction With Core Stability Exercises As Opposed to Spinal Manipulation Alone In The Treatment Of Post-Natal Mechanical Low Back Pain Wilson 2006 *Durban University of Technology, South Africa*	**Manipulation** and **exercise** group Chiropractic manipulation Diversified Technique was use (Szaraz, 1990), Core stability exercises concur with spinal manipulation	**Manipulation group** Chiropractic manipulation diversified Technique only	18 -- 35yrs >8 weeks post delivery < 6 months post delivery 30 participants Divided into 2 equal groups (15)	Quasi randomised Controlled Trial Self-selection sampling with random allocation. The study was a quantitative	**Data collection: Frequency** Group One: Data collection took place prior to the: 1st, 3rd, 7th, 10th consultations and at the 13th consultation.	Patient compliance was not measured in this study All participant completed the study no dropouts	Steeper rate of improvement of the prone measures for the manipulation and exercise group was attributed to treatment effect **Manipulation and exercise group** **Change in Prone**: *Pearson Correlation* 1 *Change in Supine:* .593(*) *Change in QPD score* .069 *Change in NRS* *.003* When compared to the manipulation group the	**Telephonic screen** Pertinent questions were asked over the telephone to determine whether the patient was a suitable candidate for the research sample	Measurement error may have occurred using the Stabilizer Biofeedback Device despite it being established as a satisfactory tool in the measuring and retraining of the transverse abdominus and multifidus muscles. Small but significant changes could be detected as more advanced technology is developed that is more accurate and sensitive

							manipulation group showed a higher level of significance (p = 0.008) than the manipulation and exercise group (p = 0.020). The manipulation and exercise group may have had the advantage of receiving more		

	.		For both groups SMT was carried out twice a week for the first 3 weeks. SMT was discontinue d if patient became asymptomatic or if there was absence of spinal fixations before completion of SMT protocol Core stability exercise performed twice a week for a	e, randomize d, comparative clinical assessment	**Measurements** Subjective data: 1. Numerica Pain Rating Scale: 2. Quebec Low Back Pain Disability Questionnaire Objective data: 1. Stabilizer Biofeedback Device (SBD) Core stability activation Quantitative timebased readings of transversus abdominus endurance were taken using the		treatments with manipulation than the manipulation group on pain and disability as evidenced by the NRS and QPD measures **Analysis of treatment effects** Intergroup **analysis** manipulation and exercise group showed a steeper rate of improvement than the manipulation group second treatment period, the statistics reveal that performing	Initial consultation, participants were assessed according to a case history, physical examination and a lumbar regional examination Postpartum mechanical low back pain diagnosis was according to Kirkaldy-Willis classification **Orthopaedic tests:** *Posterior facet syndrome*: Kemp's Test: Facet Joint Challenge	

			period of 6 weeks Group 1 – 13 consultation s – 12 treatments + final follow up concentration Group 2 – max 6 treatment consultation s – if patients became asymptomatic or there was an absence of spinal fixations – no further treatment –		Stabilizer Pressure Biofeedback Unit. Data were entered and analysed in SPSS version 11.5 (SPSS Inc. Chicago, Ill, USA). Repeated measures the study employed ANOVA to assess the quantitative outcomes between the two treatment groups over time, while accounting for the number of visits and BMI		the core stability exercises did not hold any advantage over not receiving treatment at all, p value= 0.259 suggesting that the combined effects of core stability exercise and manipulation is more beneficial than the effects of manipulation alone in the rehabilitation of the core stabilizing muscles, However, this conclusion was not supported statistically, possibly due to a type II error because of small sample size.	Prone hyperextension test Palpable muscle spasm Posterior shear test Gaenslen's test Patrick Faber test Yeoman's test ***Motion palpation****:* *of posterior fact joints & sacroiliac joints* Flexion Extension Lateral flexion	

			3 follow up consultations with no treatment for data collection Data collection was performed concurrently with both groups		as variables in the model. A Pearson correlation analysis was conducted to evaluate the associations between changes in outcome variables over time within each group, as well as separately within the two follow-up time periods. Patient adherence was not assessed in this trial.		Supine SBD readings for the manipulation and exercise group showed slightly greater gains overall than the manipulation group (rate of increase for both groups is very similar overall p=0.90). This suggests that a combination of spinal manipulation and exercise have advantages over using spinal manipulation alone in the rehabilitation of core stability musculature, although this effect is less than for the prone SBD readings. For the second treatment period, core stability		

					All participants successfully finished the study.		exercises did not hold any advantage over not receiving treatment at all Participants in the manipulation and exercise group received both manipulation and exercise for period 1, whereas the manipulation group only received manipulation. As no treatment effect was observed between the groups, this suggests that a combination of manipulation and exercise does not		

							hold further advantages with respect to the management of disability in postnatal low back pain when compared to spinal manipulation alone For the second treatment period the manipulation and exercise group only received exercises, whereas the manipulation group did not receive any treatment. Therefore, as no treatment effect was observed for this period, (it is		

							suggested that core stability exercises alone do not hold further advantages with respect to the management of disability in postnatal low back pain. NRS showed a statistically significant decrease over time in both groups (p=0.030), however the rate of decrease was the same in both groups, thus there was no evidence of a treatment effect (p=0.751).		

							Although a steeper rate of improvement overall was observed for the manipulation and exercise group, the treatment effect in either of the two periods was not statistically significant. The two treatments, manipulation alone and manipulation plus exercise, resulted in improvement over the 5 time points for all outcomes measured. There was no statistical		

							evidence of any additional benefit of the exercise over and above the manipulation. A non-significant trend towards a beneficial effect was demonstrated for time in the prone and supine positions. These two measurements were positively correlated together, thus as one time increases, so will the other time. All hypotheses were accepted and supported by the outcomes		

							Both groups showed improvement subjectively and objectively- NSD, however slight difference in intergroup findings in favour of the SMT+ exercise group – insufficient to make conclusions ***Manipulation and exercise group*** Overall change (time 5 – time 1): r=0.593, p=0.020 ***Manipulation group:*** Overall change (time 5-time 1)		

							r=0.652, p=0.008		

A Comparison of Sacroiliac Joint Manipulation versus Piriformis Muscle ice-and-stretch combined with Sacroiliac Joint Manipulation on Post-partum females suffering from Sacroiliac Syndrome. Michael Pritchard 2001 University of Johannesburg, *South Africa*	The experiment al group was treated with sacroiliac manipulation (Diversified Method), immediately after piriformis intermittent ice-and-stretch	The control group, sacroiliac manipulation (Diversified Technique) only was used.	30 participants Over 18 y.o.a females 6 treatments over 2 weeks (3 treatments a week) 2-week rest period?	Systemic randomised sampling	Primary Outcome Measures Subjective McGill Pain Questionnaire Oswestry Low Back Pain Disability Questionnaire Numerical Pain Rating Scale Objective Patients response to through objective provocative orthopaedic tests + algometer readings	Patients not completing the trial Felt better and thereafter did not comply	Average algometer readings were greater than the average readings within the control group. Experimental group responded most significantly to the treatment, as H1 was accepted and H0 was rejected by 5% according to the two sample Ttests. Percentage from McGill pain Questionnaire, The control group did not display any significant	These are not the diagnostic criteria. Diagnosis of sacroiliac joint dysfunction was confirmed by diagnostic procedures – Gaenslen's test, Patrick-Faber Test, Yeoman's test	Patient did not take any medication for five days before beginning the treatment Patients were not allowed to undergo any additional treatment.

							improvements overtime. Experimental group displayed statistically significant differences. This was indicated by T-values being less than 0.05. Statistically significant differences between treatments 1 to treatment 7, indicated that combination treatment brought statistically significant improvement within the experimental group, with Tvalue of -3,67122 and prob (less than T) by 0,0002. ODI= prob values were 0,00007, 0,0018 and 0,00338 respectively. Tvalue at T7 was greater than		

							0,05 therefore no statistical significance between T1,3&6 The graph however showed increase in medians NPRS= T-values 0,00236, 0,00318 and 0,00143 respectively there statically significant improvement in experimental group.		

Case Reports

Study; location	Intervention	Comparison	No. and age of participants; duration of study	Study design	Outcome measures	Dropouts, adverse effects	Outcome	Diagnostic criteria
Chiropractic Care for Postpartum Pelvic Girdle Pain and Low Back Pain: A Case Report Gregory & Rowell 2011 Private practice, Blackburn, Victoria, Australia	Chiropractic adjustments consisting of Thompson technique, Activator II instrument, and Diversified manual technique, HVLA thrust, myofascial release of both round ligaments, gentle torque	N/A	1 participant 33-year-old female Presented at practice 3 months postpartum Follow up continued up till 4 months	Case report	Subjective report by the patient, and not noted by questionnaire. (no disability or QoL questionnaires to provide objective findings) Physical reassessment was conducted one month after initially presenting and objectively the patient demonstrated significant change –	N/A	Objective outcome: A physical reassessment conducted one month after initially presenting and objectively demonstrated significant change. Her posture was balanced, her thoracolumbar range of motion was full, however, extension did cause some discomfort in the right SI joint. Fabere, Nachlas	Low back pain, just above hip - suffered since delivery Experienced pain daily - radiated down the leg to above the knee. Pain exacerbated by lifting and bending. Physical examination findings demonstrated a high right iliac crest, increased lumbar lordosis and forward head carriage

					balanced posture, thoracolumbar range of motion was full including other objective tests done as reported in the study.		and Seated Kemp's were negative and without local pain. Leg lengths were balanced, and subluxations were found at C1, C5, T8, T12, T10, L5 and right Sacrum Subjective outcome: The resolution of her pain was a subjective finding by the patient, and not noted by questionnaire	with posture. thoracolumbar range of motion was decreased in flexion and left lateral flexion. All thoracolumbar motion caused tension in the right sacroiliac (SI) joints stated in The European Guidelines for the diagnosis and treatment of pelvic girdle pain, pain does not have to be local but can radiate to the posterior thigh, which can affect the patient's ability to easily conduct everyday activities such as walking, standing or even sitting

								physical examination, Seated Kemps test, Nachlas test, Fabere test, Thompson leg length analysis, Palpatory examination No radiography (due to breastfeeding)
Study; location	Intervention	Comparison	No. and age of participants; duration of study	Study design	Outcome measures	Dropouts, adverse effects	Outcome	Diagnostic criteria

Chronic postpartum osteitis pubis managed with chiropractic. Fano & Mullin 2013 <u>Private Practice</u> *United States of America*	chiropractic adjustments utilizing contact specific, high velocity, low amplitude adjustments (i.e.: Gonstead technique) – 15 visits – one time per week + rest + trochanter belt for stability of the pelvic ring After 1 month - strengthening exercises (did not comply) After 3 months - Heel lift to shift weight bearing centre of gravity	N/A	1 participant/ individual A 32 year old female > 1 year (2 months after birth)	Case report	chiropractic exam MRI Standing stress radiographic analysis	N/A	Chiropractic adjustments (provided temporary relief after 1 month) and therapeutic exercise resolved the patient's osteitis pubis and normalized her functional ability. However, it is unclear if adjustments were carried through after the 3-month evaluation. patient's pain scale decreased to a 4-5/10 After 1 week of doing exercises the pain was a 2/10 and after 4 weeks there was complete resolution of pain	Referral by her OBGYN for the management of the chronic pubic symphysis pain. The pain is described as sore, stabbing, and burning that is localized and constant in the pubic region on the pubic symphysis. The patient felt better with rest but was worse when weight bearing (standing, walking, walking upstairs). She walked with a waddle gait (side to side body motion) and utilized a walker on her worse days. The MRI revealed the diagnosis of osteitis pubis

	+chiropractic adjustments every other week After 5 months- left adduction exercises and ride sided abdominal oblique exercises – reduction of pain. After 4 weeks- complete resolution of pain and Asymptomatic after 1 year							

Improved Health Outcomes in a Woman Experiencing Chronic Post-Partum Low Back Pain Hoying & Alcantara 2017 <u>Private Practice of Chiropractic, Dublin</u> *United States of America*	Chiropractic care was administered – manual and manually assisted instrument and pressure spinal adjustments High velocity low amplitude thrust adjustments assisted with drop table technique.	N/A	33-year-old female over two visits, 6 days (resolution of pain after first visit)	Case report	Resolution of pain? comparative radiographic assessment - Post AP lumbosacral xray – to document changes in the normal alignment of the spine	N/A	Resolution of pain subluxation and complete relief of symptoms a 72% improvement (correction of sacrum) relative to initial A-P radiographic analysis, low back pain reduced from 7 to 2 on a 0-10 numeric pain scale rating.	Began approximately three years prior while pregnant with first child. History revealed that patient had a C-section due to a small pelvic opening. An A-P lumbosacral radiograph demonstrated significant left sacral displacement relative to the median plane. Chiropractic examination following the Pierce Results System (PRS) analysis. Paraspinal thermal analysis, static film

								radiographs (A-P lumbosacral radiographic analysis), cervical radiographs, video fluoroscopy Pain complaint as a dull ache that is consistently notable 3-4 times a week. pain rating (0=no pain; 10=maximum pain) of 4/10 on average and a 6/10 at its worst reported by patient
Study; location	Intervention	Comparison	No. and age of participants; duration of study	Study design	Outcome measures	Dropouts, adverse effects	Outcome	Diagnostic criteria

Chiropractic management of postpartum pubic symphysis diastasis: A case report Henry 2015 Private practice *United States of America*	Transcutaneous electrical nerve stimulation (TENS) + moist heat therapy Low force chiropractic adjustments using an Activator (chiropractic percussive instrument + sacroiliac (SI) belt + Stabilizing therapeutic exercises- Kegel's, pelvic tilt and bridge,	N/A	30-year-old female patient 1 participant 14 weeks	Case report	Pain rating VAS- lower score is good as it indicates low pain levels AP pelvic radiographs – reduction of diastasis in mm	N/A	Reduction in pain from 8/10 to 2/10 at 4th visit to 1/10 at 14 week visit Reduction in diastasis – (after 5 weeks) reduced from 17mm to 12mm without the SI belt to 8mm with SI belt At 14 weeks – pubic symphysis separation was just under 10mm (without SI belt)	Objective: Pre-radiograph showing 17 mm separation at pubic symphysis. Subjective: Pain rating of 8/10 on visual analog scale (VAS). pain interfered with walking and lifting either leg, crepitus at the sacroiliac area with walking pain at the lower back and radiating to both thighs posteriorly, worse on the right, and Paraesthesia and swelling at

	progressing to core strengthening using a stability ball. + myofascial Trigger point release							both legs with prolonged standing or sitting.

4.3 RevMan Risk of Bias Assessment Report across Randomised Controlled Trials

The 3 RCTs were assessed for risk of bias using the RevMan Risk of Bias Assessment Tool (Higgins *et.al.* 2011). The 4 studies included a published study by Gausel *et al.* conducted in 2019, in Norway and 3 postgraduate dissertations which are considered grey literature. The 3 postgraduate studies were all conducted in South Africa and included a study by Pritchard conducted in 2001, another by Rosenberg, conducted in 2005, and a study by Wilson conducted in 2006. The RevMan Risk of Bias tool assessed 7 domains within each study which were “Random Sequence Generation (RSG)”; “Allocation Concealment (AC)”; “Blinding of Participants and of Personnel (BPP)” “Blinding of Outcome Assessment (BOA)”; “Incomplete Outcome Data (IOD)”; “Selective Reporting (SelR)” and “Other Potential Biases/Confounding Factors (OPBCFs)”. These 7 domains were used to assess and determine whether the study had a high, low or unclear risk of bias. This RevMan assessment was conducted by three independent reviewers (LP, RW, and AAR). Any discrepancies or inconclusive gradings were clarified with a fourth reviewer, YT.

All RCTs included in this study (both published papers and essential information from the unpublished dissertations) are available in Appendix F1- F4.

Table 4-2 is the RevMan Risk of Bias Assessment Table for all randomised controlled trials.

Table 4-2 RevMan Risk of Bias Assessment

STUDY	RANDOM SEQUENCE GENERATION	ALLOCATION CONCEALMENT	BLINDING OF PARTICIPANTS AND PERSONNEL	BLINDING OF OUTCOME ASSESSMENT	INCOMPLETE OUTCOME DATA	SELECTIVE REPORTING	OTHER POTENTIAL BIASES/CONFOUNDING FACTORS
Pritchard 2001 South Africa A Comparison of Sacroiliac Joint Manipulation versus Piriformis Muscle ice- and stretch combined with Sacroiliac Joint Manipulation on Post-partum females suffering from Sacroiliac Syndrome.	Patients randomly divided into two groups using systematic randomised sampling Every odd numbered patient was placed into the Experimental Group and every even numbered patient into the Control Group.	The method of the actual concealment wasn't specified	There is no information on whether participants or personnel were blinded	There is no information on who assessed the outcomes and if they were aware of which group the patient belonged to. Patient reported outcomes cannot be blinded hence potential for some bias exists.	Not all patients completed the trial No mention of how the non-compliance issue was dealt with and how it affected the study results overall.	All outcomes to be evaluated were reported	Primiparous/multiparous considerations multiple pregnancy considerations dropout's information mentioned No consideration of adverse effects me demographic influences: race, type

STUDY	RANDOM SEQUENCE GENERATION	ALLOCATION CONCEALMENT	BLINDING OF PARTICIPANTS AND PERSONNEL	BLINDING OF OUTCOME ASSESSMENT	INCOMPLETE OUTCOME DATA	SELECTIVE REPORTING	OTHER POTENTIAL BIASES/CONFOUNDING FACTORS
							of birth, etc. were not considered
Reviewer 1 LP	low risk	low risk	unclear	low risk	high risk	unclear	high risk
Reviewer 2 RW	Low risk	Low risk	High risk	High risk	Low risk	Low risk	Unclear
Reviewer 3 AAR	Low risk	High risk	Low risk	High risk	-	unclear	-
Final Assessment	Low risk	high risk	High risk	High risk	High risk	low risk	High risk

Rosenberg 2008 South Africa A Study to Determine the Effectiveness of	The selected were divided up into three groups of ten patients each	Concealment of allocation into the treatment groups was not stated	There was not mention of any blinding among participants or personnel	The study did not mention any blinding of the assessor of outcome measures	There is no mention of any dropouts or noncompliance in the studies	All outcomes to be evaluated were reported	Primiparous/multiparous considerations medication and other treatment influences

STUDY	RANDOM SEQUENCE GENERATION	ALLOCATION CONCEALMENT	BLINDING OF PARTICIPANTS AND PERSONNEL	BLINDING OF OUTCOME ASSESSMENT	INCOMPLETE OUTCOME DATA	SELECTIVE REPORTING	OTHER POTENTIAL BIASES/CONFOUNDING FACTORS
Chiropractic Manipulative Therapy of the Sacroiliac Joint and Pelvic Stabilisation Exercises in the Management of Post-Partum Lower Back Pain	The method of randomisation was not stated.						
Reviewer 1 LP	unclear	Unclear	High risk	unclear	Low risk	Low risk	Unclear

Reviewer 2 RW	Low risk	Low risk	High risk	High risk	Low risk	Low risk	-
Reviewer 3 AAR	Low risk	High risk	Low risk	High risk	-	High risk	-
Final Assessment	High risk	High risk	High risk	High risk	Low risk	Low risk	Unclear

STUDY	RANDOM SEQUENCE GENERATION	ALLOCATION CONCEALMENT	BLINDING OF PARTICIPANTS AND PERSONNEL	BLINDING OF OUTCOME ASSESSMENT	INCOMPLETE OUTCOME DATA	SELECTIVE REPORTING	OTHER POTENTIAL BIASES/CONFOUNDING FACTORS

Gausel et al, 2019 Norway Adding Chiropractic Treatment to Individual Rehabilitation for Persistent Pelvic Girdle Pain 3 to 6 Months After Delivery: A Pilot Randomized Trial	The women were randomized using closed envelopes. Inside the envelope was a complete identification (ID) code. Women with an ID code that ended with an even number joined the treatment group, whereas women with an ID code that ended with an uneven number were enrolled in the group that received	The envelope was handed out by the examining chiropractor (S.M.) after the first clinical examination 3 to 6 months after delivery and contained information about the allocation. There Is insufficient/no information on who did the allocation and created the closed envelopes with regards to allocation	The examiner was blinded to which group the women belonged to at the clinical examination before and after the intervention. Additional blinding or placebo treatment was not implemented. An established method to perform placebo treatment in SMT does not exist. Hence participants cannot be blinded to the treatment.	Investigator-blinded The examiner was blinded to which group the women belonged to at the clinical examination before and after the intervention. However, because there was no blinding of participants and primary outcome measure was assessed based on questionnaire by participant, some bias exists.	There were no dropouts in this pilot study. All data was recorded and analysed.	All outcomes to be evaluated were reported	Uneven number of participants in the 2 groups: Individualized rehabilitation and chiropractic treatment, n=6 Individualized rehabilitation alone, n=5 co-intervention Tx group were more physically active

STUDY	RANDOM SEQUENCE GENERATION	ALLOCATION CONCEALMENT	BLINDING OF PARTICIPANTS AND PERSONNEL	BLINDING OF OUTCOME ASSESSMENT	INCOMPLETE OUTCOME DATA	SELECTIVE REPORTING	OTHER POTENTIAL BIASES/CONFOUNDING FACTORS
	individualized rehabilitation alone.	of participants into groups. Considering that there were vast differences between both groups prior to intervention with respect to activity levels, disability index, pain levels, symptoms and general health status – it is important to state in the study how participants were allocated. This information is lacking.					during and before pregnancy Higher degree of disability (ODI), more pain (NRS), more pelvic pain symptoms (PGQ) and lower general health status (EQ-5D) No information on any medication that patients may have taken while on the trial. This could have had an impact on the pain.

STUDY	RANDOM SEQUENCE GENERATION	ALLOCATION CONCEALMENT	BLINDING OF PARTICIPANTS AND PERSONNEL	BLINDING OF OUTCOME ASSESSMENT	INCOMPLETE OUTCOME DATA	SELECTIVE REPORTING	OTHER POTENTIAL BIASES/CONFOUNDING FACTORS
Reviewer 1 LP	Low risk	Unclear	Low risk	Low risk	High risk	low risk	High risk
Reviewer 2 RW	High risk	Low risk	High risk	High risk	Low risk	Low risk	Unclear
Reviewer 3 AAR	Low risk	Low risk	Low risk	Low risk	-	Low risk	Low risk
Final Assessment	Low risk	Unclear	High risk due to no blinding on participant side and no placebo)	high risk	Low risk	Low risk	High risk

STUDY	RANDOM SEQUENCE GENERATION	ALLOCATION CONCEALMENT	BLINDING OF PARTICIPANTS AND PERSONNEL	BLINDING OF OUTCOME ASSESSMENT	INCOMPLETE OUTCOME DATA	SELECTIVE REPORTING	OTHER POTENTIAL BIASES/CONFOUNDING FACTORS
Wilson 2006 South Africa The Relative Effectiveness of Spinal Manipulation in Conjunction With Core Stability Exercises as Opposed To Spinal Manipulation Alone in The Treatment of Post-natal Mechanical Low Back	self-selection sampling	random allocation Pieces of paper labelled from one to thirty were placed in a box, which was then shaken to mix the pieces. Subjects drawing numbers one through fifteen were allocated to group one, and subjects drawing numbers sixteen through thirty were allocated to group two (Mouton, 1996).	There is no information on whether participants were blinded – however blinding on manipulative/physical treatments are difficult No blinding of personnel (researcher) due to various design and financial constraints	There is no information on who assessed the outcomes and if they were aware of which group the patient belonged to. Patient reported outcomes cannot be blinded hence potential for some bias exists.	All outcomes were reported on	All outcomes to be evaluated were reported Patient compliance was not measured	demographic influences i.e. race misrepresentation Patient compliance was not assessed No mention of how the non-compliance issue was dealt with and how it affected the study results overall.

Pain							Number of treatments differed between groups

STUDY	RANDOM SEQUENCE GENERATION	ALLOCATION CONCEALMENT	BLINDING OF PARTICIPANTS AND PERSONNEL	BLINDING OF OUTCOME ASSESSMENT	INCOMPLETE OUTCOME DATA	SELECTIVE REPORTING	OTHER POTENTIAL BIASES/CONFOUNDING FACTORS

							which may influence outcomes No mention of adverse effects considerations
Reviewer 1 LP	High risk	Low risk	Unclear	High risk	Low risk	Low risk	High risk
Reviewer 2 (YT)	Low risk	Low risk	Unclear	Unclear risk	Low risk	Low risk	High risk
Final Assessment	Low risk	Low risk	Unclear	High risk	Low risk	Low risk	High risk

4.3.1 **Risk of Bias Assessment Review Of All Randomised Controlled Trials**

STUDY: Gausel *et al.* 2019 (published) (Appendix F1)
INTERVENTION: CHIROPRACTIC TREATMENT (MANIPULATION, MOBILIZATION, SOFT TISSUE TREATMENT) + REHABILITATIVE TRAINING (POSTURAL AWARENESS EXERCISES, CORE STABILITY EXERCISES, AND STRETCHING AND STRENGTHENING EXERCISES FOR THE LOWER EXTREMITIES)
CONTROL: REHABILITATIVE TRAINING ONLY FINDING**:** NO DIFFERENCE SEEN
RISK OF BIAS: HIGH

The study by Gausel *et al*. (2019) investigated CHIROPRACTIC TREATMENT (manipulation, mobilization, soft tissue treatment) + REHABILITATIVE TRAINING (postural awareness exercises, core stability exercises, and stretching and strengthening exercises for the lower extremities) VS REHABILITATIVE TRAINING ONLY. The final outcomes demonstrated no difference with incorporating chiropractic manipulation and mobilisation and rehabilitative exercises to rehabilitative exercises only. We found that the overall risk of bias in this study to be high.

There was low risk in terms of generation of a sequence for randomisation. A method of closed envelopes was used with unique ID numbers and patients were allocated into treatment and control groups based on even and uneven ID numbers. The envelope was handed out by the examining chiropractor after the first clinical examination and contained information about the allocation. There was no information on who did the allocation and who created the closed envelopes and whether there was any concealment regarding this. Considering that the authors noted that there were vast differences between both groups prior to intervention with respect to activity levels, disability index, pain levels, symptoms and general health status, it is important to know if such allocation, although randomised was concealed to eliminate bias. In this study we considered this as an unclear risk of bias as such information was lacking. The examiner was blinded to which group the women belonged to at the clinical examination

before and after the intervention. Blinding of participants was not possible as this is challenging due to spinal manipulative therapy being the intervention and the fact that an established method to perform placebo treatment spinal manipulative therapy does not exist (Gausel *et al*. 2019). The non-blinding of the participants is the reason we considered this domain as high risk due to many of the outcomes being subjective and reported by the participants [measurement of disability (ODI), measurement of pain (NRS/PGQ) and quality of life (EQ-5D)].

As there were no dropouts in this study and all outcomes were reported on, factors on incomplete data reporting and selective reporting were considered a low risk of bias. The study did not provide any information regarding other treatments (pharmacological or non-pharmacological) that the patients may have been on during the study period. Furthermore, each participant varied in the number of chiropractic treatments they received as well as the number of rehabilitative training sessions they attended. There was also no information on compliance regarding the home exercises recommended which implies that some may have adhered to the regimen and others not. All these factors could have impact on the outcomes, thus putting this study at a high risk of bias for confounding factors.

Between 3 to 6 months postpartum, and subsequently following the intervention, the female participants were administered a questionnaire. This questionnaire included the Oswestry Disability Index (ODI), EuroQol-5D (EQ-5D), and Pelvic Girdle Questionnaire (PGQ). The key measure of the study's result was disability, which was assessed using the Oswestry Disability Index (ODI). Furthermore, they conducted an examination of the ASLR and P4 orthopaedic tests, as well as the assessment of pain using the Numeric Rating Scale (NRS), pelvic discomfort using the Pelvic Girdle Questionnaire (PGQ), and quality of life using the EQ-5D as secondary end measures. Both ASLR and P4 demonstrated a notable level of specificity and sensitivity in relation PGP.

With the exception of the orthopaedic tests P4 and ASLR, there were some variations in the clinical features among the two groups prior to the intervention. The group receiving chiropractic therapy exhibited a greater level of disability as measured by the Oswestry Disability Index (ODI), experienced more pain according to the Numeric

Rating Scale (NRS), reported more symptoms related to pelvic pain using the Pelvic Girdle Questionnaire (PGQ), and had a lower overall health status as assessed by the EQ-5D. Both cohorts, however, demonstrated enhancements in disability and pain levels after 20 weeks, although no significant changes were observed in overall health condition. Nevertheless, the disparities between the two groups were nearly eradicated. The clinical outcomes prior to and following the implementation of the intervention are given in the study. It is important to note that the high risk of bias across 5 domains in the ROB assessment, reduces reliability of the evidence in this study. This study demonstrated no difference in treatment effect between the intervention and the control, which demonstrates that the non-blinding of participants did not influence the data for the positive or negative. The small number of participants in this study, lack of even distribution between groups and confounding factors caused the authors to rate the overall risk of bias in this study as high.

STUDY: Pritchard 2001 (Appendix F2)
INTERVENTION: CHIROPRACTIC TREATMENT (Sacroiliac Joint Manipulation) + PIRIFORMIS MUSCLE ICE- AND-STRETCH COMBINED
CONTROL: CHIROPRACTIC TREATMENT (Sacroiliac Joint Manipulation) ALONE
FINDING: COMBINATION IS BETTER THAN CHIROPRACTIC TREAMENT ALONE
RISK OF BIAS: HIGH

In a South African study by Pritchard (2001), the effectiveness of two different interventions was investigated. The first intervention involved chiropractic treatment, specifically sacroiliac joint manipulation with ice-and-stretch techniques for the piriformis muscle, while the second intervention (serving as a control) involved chiropractic sacroiliac joint manipulation only. The findings of this study suggest that the combined intervention, which includes both sacroiliac joint manipulation and the piriformis muscle ice-and-stretch technique, yielded superior results compared to chiropractic treatment alone. However, our assessment was that this study was associated with a high risk of bias.

Although there was a low risk in terms of random sequence generation, there was no mention of any concealment with regards to the allocation of participants in the

experimental or treatment groups. Furthermore, there was no mention of blinding of the examiner of outcomes for each group. Participants were also not blinded; however, participant blinding is challenging with manipulative therapy and we have acknowledged this previously. Both these factors contribute to a high risk of bias in the study.

There were dropouts in this study as it is stated that not all participants completed the study. However, there is no further information on how many dropped out, at which stage, whether they belonged to the experimental or control group. Due the mention of not all participants completing the study and no details surrounding these dropouts, there was incomplete outcome data which poses a high risk of bias. From the participants that completed the study, all outcome measures were determined and reported on resulting in a low risk of bias in this domain.

Other confounding factors not discussed in the study were the demographics of the participants and their possible influence on the study outcomes. Height, weight, socioeconomic status could all impact on treatment outcomes. Multiple pregnancies, type of birth (caesarean, vaginal), primiparous or multiparous pregnancies could all have an impact on severity of condition and thus treatment outcomes. The lack of information on this also poses high risks of bias. It is of note this that study was not a published peer reviewed study, but a dissertation stemming from a postgraduate research. Thus, many of the factors above which are a cause of concern in terms of strengthening the reliability of evidence was overlooked in this randomised controlled trial.

The outcomes from all outcome measures (NPRS, McGill's questionnaire, pain provocation orthopaedic tests) indicated statistically more notable differences and improvements with the experimental group (combination treatment), except for the ODI measure which observed no statistically significant differences. The lack of improvement indicated that according to the ODI, the participants were not recovering significantly in this regard, thus suggesting that participants may have required more precise guidance on how to conduct the piriformis muscle home stretches adequately.
The high risk of bias across 5 domains in the ROB assessment, reduces reliability of the evidence in this study.

STUDY: Rosenberg 2008 (Appendix F3)

INTERVENTION 1: DIVERSIFIED CHIROPRACTIC MANIPULATION THERAPY + SLOW DYNAMIC STRENGTHENING EXCERCISES

VS

INTERVENTION 2: DIVERSIFIED CHIROPRACTIC MANIPULATION THERAPY ALONE VS

INTERVENTON 3: DYNAMIC STRENGTHENING EXERCISES ALONE **FINDING:** COMBINED TREATMENT OF CMT + SLOW DYNAMIC STRENGHTENING EXERCISES WAS THE MOST EFFECTIVE PROTOCOL FOR TREATING POST PARTUM LOW BACK PAIN (THE FINDING WAS NOT SIGNIFICANT BUT THE COMBINATION GROUP SHOWED A GREATER IMPROVED TO THE OTHER TWO GROUPS)

RISK OF BIAS: HIGH

In a study conducted by Rosenberg (2008), the effectiveness of three different interventions was investigated for the treatment of postpartum low back pain. The first intervention involved diversified chiropractic manipulation therapy (CMT) combined with dynamic strengthening exercises, while the second intervention included chiropractic treatment alone, and the third intervention focused solely on strengthening exercises. Notably, the study found that the combination of chiropractic treatment and slow dynamic strengthening exercises was the most effective protocol for addressing postpartum low back pain. Although the findings were not statistically significant, the combination group demonstrated a greater improvement compared to the other two groups. It is important to note that the risk of bias assessment was associated with a high risk of bias, which can affect the reliability of the results. Nevertheless, the study suggests that the combined approach may hold promise for individuals experiencing postpartum low back pain.

As this was an unpublished dissertation for postgraduate study purposes, there was no peer review evaluation. Many of the factors that require reporting in clinical trial are thus absent. Randomisation was conducted amongst participants within 3 groups (intervention and 2 comparative measures) in this study. There was no mention of how

the randomisation was conducted (random sequence generation), nor was there information on the concealment of how participants were allocated into the three groups. Hence this study is considered to have a high risk of bias on randomisation alone. There was also no mention of blinding of participants, personnel or the outcome assessor.

It can be assumed based on the purpose of the study, that there was no blinding and that the assessor of outcome measures was the primary investigator in this study and was not blinded to the randomisation process, group allocations, or which groups participants belonged to when assessing outcomes. This further yielded a high risk of bias. There was no mention of dropouts and it can be assumed that the data analysed was on all 30 participants and all outcomes were reported on yielding a low risk of bias for the ROB domains of incomplete outcome data and selective reporting. There was lack of information regarding specific diagnostic criteria, primiparous/multiparous history of participants, and other pharmacological or non-pharmacological treatment that patients may have sought while on the trial. However, it remains unclear what risk these would pose on outcome data. The study found no statistical differences on intergroup analysis, however, because the combined treatment improved by a larger percentage compared to either treatment alone, it was recommended that combined treatment of CMT + slow dynamic strengthening exercises was the most effective protocol for treating postpartum low back pain. Overall, due the large number of bias risks on critical elements of blinding and randomisation, we rated this study as having high level of risk of bias.

STUDY: Wilson 2006 (Appendix F4)
INTERVENTION: SPINAL MANIPULATION AND CORE STABILITY EXERCISES (13 CONSULTATIONS)
CONTROL: ONLY SPINAL MANIPULATION
FINDING: NO DIFFERENCE SEEN
RISK OF BIAS: HIGH

In a study conducted by Wilson (2006), the effectiveness of spinal manipulation in combination with core stability exercises for low back pain in post-natal females was investigated. Spinal manipulation in combination with core stability exercises was the

intervention while spinal manipulation alone was the control group. Both groups indicated improvement during the course of the investigation. Outcome measures, which included subjective data (Numerical Pain Rating Scale, Quebec Low Back Pain Disability Questionnaire) and objective data (Stabilizer Biofeedback Device, via Core stability activation) were consistently applied for both groups. In terms of effectiveness, when compared, no differences between the two groups was observed. Due to this being an unpublished dissertation for postgraduate study purposes, there was no peer review evaluation. Self-selection sampling with random allocation meant that this was a Quasi-randomised Controlled Trial, and not an organic RCT. The study over all had high risk of bias due to there being no outcome blinding of the researcher. There was a low magnitude of effect, in terms of imprecision. This was due to the low sample size and the lack of statistical significance, thus impacting the quality and strength of this evidence negatively.

4.3.2 **Grade Assessment Across the Randomised Controlled Trials**

All RCTs were then assessed for quality of the body of evidence as a whole. We used the GRADE (Grading of Recommendations, Assessment, Development, and Evaluation) framework to assess the certainty of evidence from all RCTs (Guyatt *et al.* 2008). GRADE is a system used to evaluate the quality of evidence in studies in healthcare and make recommendations (Higgins *et al.* 2011). It assesses evidence based on five domains:

Risk of Bias: This domain assesses the methodological quality of individual studies. It considers factors such as randomization, blinding, allocation concealment, and other aspects of study design that can affect the risk of bias.

Consistency: This domain examines the consistency of results across different studies or populations. Inconsistencies in study outcomes may lower the quality of evidence. Directness: Directness refers to the extent to which the available evidence directly addresses the clinical question of interest. Evidence from studies that closely match the patient population and intervention under consideration is considered higher quality.

Precision: Precision considers the degree of certainty or uncertainty in the study outcomes. Studies with larger sample sizes and narrower confidence intervals are considered higher quality in this domain.

Publication Bias: Publication bias assesses whether there is a risk that studies with certain results (typically positive or statistically significant) are more likely to be published, leading to an overestimation of treatment effects.
Other Considerations: Depending on the specific context and the clinical question being addressed, additional domains may be relevant. These could include dose response relationships, the magnitude of effect, and the presence of plausible confounding factors.

The GRADE framework uses a systematic and transparent process to assign a grade (high, moderate, low, or very low) to the quality of evidence, which in turn informs the strength of recommendations (strong or weak) (Higgins *et.al.* 2011). The following is an interpretation of each domain:

Risk of Bias: Evaluates how well studies were conducted and if they might have biased results.
Inconsistency: Considers whether there is variability or contradictions in the results across different studies.
Indirectness: Assesses if the evidence directly addresses the research question or relies on indirect measures.
Imprecision: Examines the level of uncertainty in the evidence, considering factors like confidence intervals and sample size.
Publication Bias: Investigates whether studies with significant results are more likely to be published, potentially skewing the evidence.
These domains help ensure that healthcare recommendations are based on the most reliable and unbiased evidence (Higgins *et al.* 2011).

GRADE takes all these domains into account when rating the quality of evidence, which can be high, moderate, low, or very low. The quality of evidence influences the strength

of recommendations in healthcare, making sure that healthcare decisions are based on the best available evidence (Guyatt *et al.* 2008).

Table 4-3 is a summary of the GRADE assessment done across all included RCTs in this systematic review.

Domains for assessing certainty of evidence	**Questions asked**	**GRADE certainty of evidence**	**Reasons for lowering certainty of evidence**
Risk of Bias	Were there flaws in the study design or execution that could affect the results?	Low (-2)	Downgraded by 2 because all 4 RCTs have a high level of risk of bias, there was no blinding in 3 of the RCTs
Inconsistency	Are the results from different studies consistent or are there are large variations?	Low (-2)	Downgraded by 2 because there was much heterogeneity amongst all 4 RCTs. Gausel et al. (2019) determined that no difference seen, while Pritchard's study concluded that combination is better than chiropractic

Table 4-3 GRADE level of certainty across all Randomised Controlled Trials

			treatment alone. Rosenberg (2008) indicated that combined treatment of CMT + slow dynamic strengthening exercises was the most effective protocol for treating postpartum low back pain (finding was not significant, but the combination group showed a greater improved to the other two groups). There is inconsistency with regards to the different types of treatments that were compared in both intervention and controls across all studies. Wilson (2006) revealed that when compared, no differences between the spinal manipulation and exercise group vs spinal manipulation alone group was observed.
Indirectness	Did the studies directly answer the question or	Moderate (-1)	Downgraded by 1. All 4 RCTs did not vary significantly from the

	are they somewhat related but not a perfect fit?		research question posed. Although variations in comparative measures existed across the 4 RCTs. The adjunctive therapies differed from study to study. The controls and the experimental groups were also not exactly the same throughout the 4 studies. Gausel et al. (2019) compared chiropractic treatment with individualized rehabilitation vs individualized rehabilitation alone. Pritchard compared Sacroiliac Joint Manipulation versus Piriformis Muscle ice-and-stretch combined with Sacroiliac Joint Manipulation on Post-partum females suffering from Sacroiliac Syndrome. Rosenberg (2008) compared Diversified CMT alone **vs** Slow Dynamic Strengthening

			Exercises of Gluteus Medius, Piriformis and Psoas Muscles vs Diversified CMT and Slow Dynamic Strengthening Exercises of Gluteus Medius, Piriformis and Psoas Muscles together. Wilson (2006) compared manipulation and exercise (Group one) vs spinal manipulation alone (Group two)
Imprecision	Are the sample sizes and the number of events in the studies enough to draw solid conclusions, or are they too small?	Low (-2)	The sample sizes were too small to draw solid conclusions.

Publication bias	Are the studies that got published biased in favour of positive results?	Not assessed	3 of the 4 RCTs were unpublished, non-peer reviewed research studies (dissertations). There were no funding sources or conflicts of interest reported in the published study hence no publication bias could be considered.

4.3.2.1 Interpretation and Justification of GRADE assessment across all RCTs

Risk of bias

The risk of bias was assessed and reported in preceding sections. We graded the risk of bias as high across all studies. For this reason, we downgraded the level of certainty by 2 and report a low level of certainty across all RCTs.

Inconsistency

Results across studies:

There was much heterogeneity with regards to the results of the individual RCTs with significant variation in their findings, thus inconsistent with each other. Of the 4 RCTs, only 1 showed significant results. This was in favour of a combination of piriformis muscle ice and stretch and sacroiliac joint manipulation (Pritchard 2001). Combination therapy of chiropractic manipulation and slow dynamic strengthening exercises was the recommended protocol in 1 RCT due to some improvement noted although not calculated as significant (Rosenberg 2008). The 3rd RCT showed no difference in the outcomes between chiropractic treatment with rehabilitative training exercises and

chiropractic alone (Gausel *et al.* 2019). Furthermore, the 4th RCT indicated that the addition of exercise to spinal manipulation did not yield a statistically significant improvement compared to spinal manipulation alone (Wilson 2006). No statistically significant evidence was found to support any additional benefits of the core stability exercise in comparison to the manipulation technique (Wilson 2006). It was also important to note the heterogeneity in comparative measures varied across all studies.

Sample size, Duration, Diagnostic Measures:

The studies also varied in terms of patient numbers where one RCT was a pilot study with only 11 women (Gausel *et al*. 2019) verses 30 in the other 3 RCTs. These 4 RCTs varied in duration of the study and number of chiropractic treatments (2 weeks (6 treatments) (Pritchard 2001), 20 weeks (up to 12 treatments) (Gausel *et al.* 2019), 3 weeks (6 treatments) (Rosenberg 2008) and 6 weeks (13 consultations)) (Wilson 2006). All 4 RCTs reported largely on sacroiliac joint pain post-partum, while Wilson (2006) also emphasized on lumbar facet syndrome. All 4 studies confirmed postpartum low back pain using diagnostic tests.

Types of Treatment

In this SR, 3 of the 4 RCTs compared chiropractic manipulative therapy (CMT) with exercises (either rehabilitative training i.e. postural awareness exercises, core stability exercises, and stretching and strengthening exercises for the lower extremities, OR slow dynamic strengthening exercises). The results varied in that the RCT showed no difference in effect between the combination of CMT and rehabilitative training vs rehabilitation training alone (Rosenberg 2008) and the other RCT demonstrated that a combination of CMT and slow dynamic strengthening exercises showed a large improvement, although not significant (Gausel *et al.* 2019). Also, the one RCT revealed that when compared, no differences between the spinal manipulation and exercise group vs spinal manipulation alone group was observed (Wilson 2006). The other RCT demonstrated that CMT together with ice and stretch of the piriformis muscle was significantly better than CMT only (Pritchard 2001).

Outcome Measures

All 4 RCTs used the numerical pain rating scale (NPRS) and 3 used Oswestry Disability Index Questionnaire (ODI) to assess as subjective outcome measures. Additional pain questionnaires were also used (Pritchard using McGill Questionnaire; Gausel and colleagues, using the pelvic girdle questionnaire (PGQ)) as well as the quality of life (QoL) questionnaire (EQ-5D) (Gausel et al 2019). Instead of the ODI, Wilson (2006) used the Quebec Low Back Pain Disability Questionnaire. The objective outcome measurement assessments differed in all 4 RCTs using different provocative orthopaedic tests for mobility and to elicit pain (e.g. ASLR, P4 and Modified Schober's test). The algometer was used as one of the objective outcome measures in Pritchard's (2001) study, while the Stabilizer Biofeedback Device was utilized in Wilson's (2006) study.

Imprecision

There was imprecision noted among studies in this SR. This was due to the very small number of study participants in all studies. In one RCT, which was a pilot study, there were only 11 participants (Gausel *et al.* 2019). Although the other RCTs had 30 participants each (Pritchard 2001, Rosenberg 2008 and Wilson 2006), one of them had lost participants during the trial and this number was not commented on in this respective RCT (Pritchard 2001). In the other RCT, the 30 participants were divided into 3 groups of 10 as there were 3 interventions compared to each other, thereby yielding a small sample size (Rosenberg 2008). The data across the RCTs is thus limited, making the estimates less reliable, hence making it more challenging to draw definitive conclusions. Due to this, we downgraded by 2 for imprecision.

Indirectness

The formulation of the primary research question for the systematic review topic was guided by the structured PICO (Patient/Population, Intervention, Comparison, and Outcome) framework.

Table 4-4 PICO Framework

P	Health Problem / Population - Postpartum low back pain/ pelvic girdle pain
I	Intervention - Chiropractic manipulation and mobilisation
C	Other Interventions - NSAIDS, activity modification, bracing, rehabilitation, etc.
O	Outcome - Clinical efficacy or effectiveness in the resolution of pain

The research question was:

Is chiropractic manipulation and mobilisation more effective in resolving low back/pelvic girdle pain in postpartum women, in comparison to other interventions?

The study populations, interventions, or outcomes in all RCTs included in this SR are all directly applicable to the research question, hence there was no significant downgrading for indirectness. However, due to the variation in comparative measures across the studies, we downgraded by 1 and rated this domain as moderate.

Overall GRADE assessment

Taking into account all the considerations evaluated and discussed within each domain when assessing the level of certainty across all the RCTs, it is evident that the overall grade of certainty is low. This conclusion is primarily due to the presence of a low level of certainty in three out of the four assessed domains. There was also heterogeneity in relation to the results and findings across all 4 RCT. This may have been influenced largely by the evident variations in the interventions, duration of the treatment protocols and the need across all RCTs for larger sample sizes. This indicated that there are significant concerns regarding the quality and robustness of the evidence. Therefore, based on the current literature, there is a moderate provision of answers to the question at hand. The certainty of the evidence (in terms of ROB, Inconsistency and Imprecision) on the effect of chiropractic manipulation alone or in combination with prescribed exercises and/or ice-and-stretch for the treatment of postpartum low back pain/pelvic girdle is low.

4.4 Assessing Quality of Evidence In Case Reports

For assessing the quality of the case reports included in this SR, the Joanna Briggs Institute Critical Appraisal Tool (JBICAT) for Case Reports was selected (Appendix C1C8). This was an appropriate tool as it provides a structured approach to evaluate the quality and reporting of case reports (Moola *et al.* 2017). The tool provides a list of standardised questions for researchers and reviewers to consider, thereby promoting quality improvement in case report literature by encouraging authors to adhere to reporting standards, ultimately raising the overall quality, transparency and credibility of case report literature available in a particular field (Moola *et al.* 2017).
In our searches, we found 4 case reports dating from 2011-2017 (Hoying and Alcantara 2017: 128-132; Henry 2015; Fano and Mullin 2013; Gregory and Rowell 2011) (Appendix F5- F8). Three of these were from the United States and 1 from Australia. The primary researcher and one additional reviewer (YT) assessed these case reports for quality and reliability of the published information.

Summary of Case Report 1: Gregory and Rowell 2011 [Appendix F6] **Patient:** 33 yrs., 3 months PP, 4 months follow up

Treatment

Manipulation: Chiropractic adjustments consisting of Thompson technique, Activator II instrument, and diversified manual technique, HVLA thrust|

Mobilisation: myofascial release of both round ligaments, gentle torque

Diagnosis was based on physical examination alone and radiographic confirmations as patient was breastfeeding. Physical examination included the following: seated Kemps test, Nachlas test, Fabere test, Thompson leg length analysis and palpatory examination. The outcome measures were all subjective and reported by the patient (not noted in any validated or standardised pain, disability or quality of life questionnaires). Following a month of initial presentation, physical reassessment was conducted and objectively the patient demonstrated significant change – balanced posture, thoracolumbar range of motion was full, although extension caused some discomfort in the right SI joint. The objective tests performed included Fabere, Nachlas

and Seated Kemp's were negative and without local pain. Leg lengths were balanced, and subluxations were found at C1, C5, T8, T12, T10, L5 and right Sacrum.

JBI appraisal: Gregory 2011

The JBI critical appraisals conducted by both reviewers can be found in Appendix C2 and C6. In the appraisal of this case report, several key aspects were evaluated. The patient's demographic characteristics were found to be inadequately described, which may limit the overall comprehensiveness of the case. However, the patient's history and current clinical condition were well-presented, offering a clear understanding of the case's context. Diagnostic tests and assessment methods, though generally described, lacked radiographs due to the patient's breastfeeding status, potentially affecting the thoroughness of the assessment. The intervention and post-intervention clinical condition were well-documented. However, the absence of identification and description of adverse events or unanticipated events leaves gaps in the report. On a positive note, the case report does provide valuable takeaway lessons. Firstly, the symptoms of the patient were mixed i.e. the patient had left low back pain above the hip even though orthopaedic and regional assessments detected that the sacroiliac joint (SIJ) was the source of her pain. Such amalgamations of symptoms may be frequent among postpartum patients. Postpartum pain may sometimes cease on its own or may persist. Chiropractic treatment was therefore proven efficient in settling this type of postpartum pain. In consideration of these points, further clarification on patient demographics, and the inclusion of any potential adverse events would enhance the case report's completeness. The decision to include or exclude the report should be made with these factors in mind.

The use of subjective outcome measures, particularly in the absence of validated and standardized questionnaires for assessing pain, quality of life (QoL), and disability, carries several implications. These measures rely heavily on individuals' personal perceptions and interpretations, making true reliable data collection less objective. Furthermore, the generalizability of findings can be limited, and precision in assessing the severity of the condition or treatment effectiveness can be compromised. The difficulty in accurately tracking patient progress over time and the potential for imprecise

assessments are additional challenges. In clinical and research settings, standardized questionnaires are preferred because they give a common and clear way to understand how people are feeling and how treatments are working. This makes the evidence more robust and helps doctors and researchers make better decisions based on the information.

SUMMARY OF CASE REPORT 2: Hoying and Alcantara 2017 [Appendix F8]
PATIENT: 33 years; low back pain began approximately three years prior; 3 followups; The patient did not experience a single bout of low back pain since her adjustments 6 days prior.

Treatment

Manipulation: Chiropractic adjustments (HVLA thrusts) assisted by pelvic drop piece on the Zenith model 230 plus table.

The diagnosis was established through the utilisation of the Pierce Results System (PRS) analysis and the patient's subjective pain rating. In regard to pain (0=0; 10=maximum pain), she rated her pain as 4/10 on average and 6/10 at its most severe. A comprehensive thermographic pattern of the spine was obtained through a paraspinal thermal analysis utilising the Platinum System infrared thermography camera in conjunction with the Tytron C5000 instrument. Video-fluoroscopy was employed in tandem with the radiographic analysis of static film. Lantz's VSC model was implemented to validate and supplement the results obtained from thermographic and radiographic examinations in the field of chiropractic. An AP lumbosacral radiographic examination identified a 21mm leftward displacement of the sacrum in relation to the median plane. Later, video-fluoroscopy confirmation of lumbar body rotation on the same side as sacral displacement at vertebral levels L5, L4, L3, L2, and L1 was achieved. The chiropractic listing, as classified by the Pierce Results system of analysis, is denoted as a left excision. A reduction in motion was observed in the lumbar spine at the vertebral levels L5, L4, L3, L2, and L1 during left lateral flexion. The thermographic and radiographic examination performed by the chiropractor identified the presence of numerous vertebral subluxations. A correlation was established between these results and the kinesiopathological and neuropathological elements of the VSC model that Lantz had proposed. Comparative radiographic evaluation was utilised as an outcome

measure after the patient reported that she had not encountered a single episode of low back pain in the six days since her adjustments.

JBI critical appraisal: Hoying and Alcantara 2017

The JBI critical appraisals conducted by both reviewers can be found in Appendix C4 and C8. During the assessment of the case report, a number of critical elements were examined. While the age and gender of the patient were provided, additional demographic information would have been beneficial. Extensive details would have enhanced the contextual understanding of this case and increased the dependability of extrapolating the results. The timelines were coherently presented, and the patient's medical history was comprehensively delineated. With additional objective data, however, a more precise clinical background (OBGYN) could have been provided. The diagnostic procedures and methods of evaluation were described in detail, and the outcomes were reported sufficiently. While the treatments and interventions implemented were thoroughly described, a bit more emphasis on the specific tasks performed during the designated visits would have enhanced comprehension and eliminated any potential perplexity that may have arisen. Although the post-intervention clinical condition was partially specified, a more comprehensive chiropractic evaluation, specifically a complete PRS analysis, would have offered more robust evidence to support the post-intervention outcomes. There was no mention of unanticipated effects or adverse events. It is unknown whether this is due to the absence of adverse effects or the mere omission of this information. This may heighten the potential for bias with regard to the reporting of the results. However, there were some valuable insights in the case that provide good takeaway lessons. In this case, postpartum low back pain persisted for three years demonstrating the length of time unsuccessfully treated or untreated pelvic pain can persist. Additionally, the potential consequences of foetalpelvic disproportion on pelvimetry should be noted. Chiropractic manipulation is a highly viable intervention for managing and treating collateral low back pain, according to this case study.

Summary of Case Report 3: Henry 2015 [Appendix F7]

Patient: 30-year-old female, seven days postpartum, 14 weeks follow up Treatment

Manipulation: Chiropractic adjustments - low force chiropractic adjustments using Activator (chiropractic percussive instrument)

Adjunctive modalities: Transcutaneous electrical nerve stimulation (TENS) and moist heat therapy, specific stabilizing therapeutic exercises (Kegel's, pelvic tilt and bridge, progressing to core strengthening using a stability ball), sacroiliac (SI) belt, Manual compression.

The patient's ability to walk was significantly compromised, necessitating help from her spouse for distances beyond a few steps. Additionally, her motions exhibited signs of pain. The straight leg lift test yielded negative results. The motor function of the lower extremities was assessed to be at a grade of 5/5. The deep tendon reflexes had a grade of 2+ in the lower limbs. The results of dermatome testing conducted on the lower limbs yielded normal findings. The ranges of mobility in the lumbosacral region were found to be restricted. Upon palpation, it was seen that there was an evident asymmetry and limitation present at the L4, L5, sacrum, and both sacroiliac joints. The assessment of leg length inequality was conducted. The radiology report was examined for the previous anteroposterior (AP) pelvic radiograph, which was captured five days after childbirth. At 7 days after childbirth, the lumbopelvic area of the patient was imaged using anteroposterior (AP) and lateral digital radiographs.

Following a duration of five weeks of chiropractic treatment, the patient underwent a consultation with an orthopaedic surgeon. The individual expressed signs of improvement, although it persisted in restricting her capacity to engage in activities such as standing, walking, bending, and engaging in sexual intercourse. The individual said that pain alleviation was achieved through the use of chiropractic therapy, the application of moist heat, and the administration of ibuprofen. The orthopaedist prescribed anteroposterior pelvic radiographs, both with and without a sacroiliac belt. The diastasis measurement decreased to 12 mm in the absence of the sacroiliac (SI) belt, and further decreased to 8 mm when the SI belt was utilised. The orthopaedist advised the patient to continue utilising the SI belt, since it was found to be efficacious in mitigating the diastasis.

Following a six-week period of chiropractic therapy, the patient documented a gradual enhancement in functional capabilities, characterised by diminished challenges in transitioning from a seated position, decreased difficulties in walking and ascending stairs, as well as reduced discomfort when resting on her side. The patient presented for a subsequent session after a duration of roughly nine weeks and received treatment in the form of Activator chiropractic adjustment targeting the L5 vertebra, sacrum, and the sacroiliac joints, in addition to receiving home exercise suggestions. The individual persisted in engaging in home workouts and used the sacroiliac belt. During the fourteen-week follow-up assessment, the individual reported a pain rating of 1 out of 10 on the Visual Analogue Scale (VAS). A lumbopelvic radiograph was performed and revealed a pubic symphysis separation of little less than 10 mm.

JBI critical appraisal: Henry 2015

The JBI critical appraisals conducted by both reviewers can be found in Appendix C3 and C7. During the evaluation of the case report, many crucial elements were assessed. The patient's age, gender, and interests were provided, but further information on the demographics would have been beneficial. The inclusion of comprehensive information would have provided enhanced contextualization and increased the overall dependability of the findings. The patient's medical history was thoroughly documented, and the relevant timeframes were appropriately delineated, providing a comprehensive contextual background of the case. The diagnostic tests and assessment techniques were effectively described, and their outcomes were also appropriately documented and corroborated by radiographic imaging. The documentation of both the intervention and post-intervention clinical status was thorough. The inclusion of other diagnostic tests, such as orthopaedic testing, in the office setting might have further improved the patient's clinical condition following the intervention. Relying solely on x-rays may not have adequately addressed the patient's functional status.

The report lacked identification and description of adverse occurrences or unforeseen events, resulting in gaps. The reason for the absence of detrimental effects remains uncertain, as it is unclear if this information was intentionally suppressed or just not

present. This phenomenon might potentially heighten the likelihood of bias in relation to the manner in which the results were documented. However, there were really some genuine and interesting lessons to be derived from the case. Although chiropractic therapy has demonstrated efficacy in improving health outcomes, chiropractors are also capable of effectively collaborating with other healthcare professionals, such as midwives and obstetricians, through consultations and shared patient care. Collaborations of this nature have the potential to generate substantial outcomes for individuals afflicted with postpartum pubic symphysis diastasis.

Summary of Case Report 4: Fano And Mullin 2013 [Appendix F5]
Patient: 32 Years, 2 Months Postpartum, 15 Follow-Ups
Treatment
Manipulation: Gonstead Technique: Specific Contact Hvla
Adjunctive Therapy: Trochanter Belt+ Exercises (Abdominals, Hamstrings, Quadriceps) + Heel Lift+ Walker

The magnetic resonance imaging (MRI) scan provided a diagnosis of osteitis pubis. The chiropractic examination indicated that there was a restriction in the left sacroiliac (SI) joint, which was accompanied by notable limitations in movement in all directions as observed by static palpation, motion palpation, and the use of a nervoscope device to assess the lumbar and SI joint regions. The application of standing stress radiography analysis to the pubic bone resulted in the identification of a 4 mm superior displacement of the pubic symphysis on the side corresponding to the leg bearing weight. The results of the neurological examination fell within the expected range, but the assessment of motor function was impeded by the presence of discomfort. The patient indicated that the level of discomfort experienced was rated at 7 out of 10. The assessment of motor function in the lower extremities was constrained as a result of the presence of discomfort.

Following a period of 5 months dedicated to the analysis and use of the Gonstead approach, it was seen that the patient's pain level saw a reduction, reaching a range of 4-5 on a scale of 10. A comprehensive manual muscle testing assessment was conducted 5 months later, which indicated pronounced weakness and discomfort in the

left hip adductors and right abdominal oblique muscles. The patient received instructions to perform left leg adduction exercises and right-sided abdominal oblique workouts within their own limits. Following a duration of one week engaging in exercise, the level of discomfort experienced by the individual was rated at 2 out of 10. Subsequently, after a span of four weeks, the pain and associated symptoms were entirely alleviated, enabling the patient to resume their regular exercise regimen. After a period of one year, the patient continued to exhibit no symptoms.

JBI critical appraisal: Fano and Mullin 2013

The JBI critical appraisals conducted by both reviewers can be found in Appendix C1 and C5. The evaluation of the case report encompassed the assessment of many crucial elements. The patient's demographic parameters were determined to be insufficiently described, perhaps constraining the overall comprehensiveness of the case. Nevertheless, the comprehensive presentation of the patient's medical history and their current clinical status provided a lucid comprehension of the contextual background of the case. The relative chronology was also appropriately acknowledged, so presenting an accurate sequence of occurrences. The diagnostic procedures and testing methods were explained clearly, and the results were suitably recorded and firmly supported by nervoscope and radiographic imaging equipment.

The documentation pertaining to both the methodology employed and the following clinical condition was comprehensive. However, it is evident that the report is deficient in terms of incorporating the identification and description of bad occurrences or unforeseen events, hence leading to notable gaps in the information presented. This case provided important takeaway lessons. The findings suggest that including sacroiliac joint motions and strengthening exercises into the treatment regimen may provide considerable improvements in patients. The duration of chiropractic care required for patient restoration may exceed a period of five months. Nevertheless, the findings of the study suggest that the effects of chiropractic therapy were observable even after the passage of one year.

It is crucial to note, however, that employing subjective outcome measures, especially in the absence of validated and standardised questionnaires for evaluating pain, quality of life (QoL), and disability, has several concerns. These metrics are strongly dependent on individuals' subjective impressions and interpretations, which compromises the objectivity and reliability of data collection. Moreover, it is important to note that there may be potential limitations in accurately measuring the severity of the illness or the success of the treatment. One of the issues that arises in effectively monitoring patient improvement over time, is the possibility for inaccurate judgements. In clinical and scientific contexts, standardized questionnaires are favoured because they offer a common and unambiguous approach to understand how individuals are feeling and how treatments are functioning. This enhances the strength of the evidence and facilitates informed decision-making for medical professionals and researchers.

OVERALL SUMMARY FROM ALL 4 CASE REPORTS

The adverse effects throughout the 4 case reports (CR) were not narrated. This negatively impacted the quality of the evidence, as this eluded to a deficit within the literature which may suggest selective reporting and biased outcomes. Each CR had some valuable takeaway lessons. Hoying and Alcantara (2017) highlighted on the possible influence that foetal-pelvic disproportion imparts on pelvimetry. Gregory and Rowell (2011) also pointed out how postpartum pain well above the hip region, in the lower back, may still originate from the SI joint. This information may be valuable when curating guidelines for healthcare givers on approaching such patients. Fano and Mullin (2013) reiterated that even though it may have taken more than 5 months for the patient to recover with chiropractic care, the results of the interventions proved to be long-term. Finally, Henry (2015) shed some light on the collaboration between different healthcare providers (e.g. midwives, obstetricians, etc.) in managing such patients and the positive outcomes thereof.

5 CHAPTER FIVE
DISCUSSION

5.1 Discussion

Prior research has examined and documented empirical findings about the efficacy of chiropractic interventions in addressing postpartum low back pain (Bailes 1998; Gregory and Rowell 2011; Fano and Mullin 2013; Gausel *et al.* 2019). However, results from this study revealed that there are significant concerns regarding the quality and robustness of the evidence. This was after taking into account all the considerations evaluated and discussed within each domain when assessing the level of certainty across all the RCTs, it is evident that the overall grade of certainty is low. This conclusion is primarily due to the presence of a low level of certainty in three out of the four assessed domains. Several studies have revealed comparable outcomes specifically for chiropractic manipulation and mobilisation. Ali, Rabea and Khudhair (2012) have shown that the manipulation of the sacroiliac joint exhibits more efficacy compared to standard treatment modalities, such as medication, rest, and surgery, in the context of postpartum backache care. Case reports, which was included grey literature, were included (Paez 2017: 233-240). The adverse effects throughout the 4 case reports (CR) were not narrated. This negatively impacted the quality of the evidence, as this eluded to a deficit within the literature which may suggest selective reporting and biased outcomes. It is important to note that case reports are also considered as low-quality evidence and there the evidence they present is deemed inferior to that of RCTs.

It was therefore important to look into chiropractic care, globally and also in the local context of South Africa, as most primary care physicians struggle with managing pain (Erwin, Korpela and Jones 2013; Hestbaek *et al.* 2014; Weis et al. 2020) – it is important to identify professions that may have effective treatment modalities, as this presents broader options in the treatment and management of PPLBP to assist in ensuring optimal maternal healthcare in line with the World Health Organisation's Millennium Development Goal 5, which the National Department of Health of South Africa has committed to, in improving maternal health and reducing maternal and perinatal mortalities (Ngxongo, Sibiya and Gwele 2016).

The studies mentioned above (Bailes 1998; Gregory and Rowell 2011; Fano and Mullin 2013; Gausel *et al.* 2019), may have demonstrated clinical efficacy. However, it is important to note that the reliability and quality of evidence supporting these studies have not been examined. Therefore, it is necessary to validate the findings and determine if clinical effectiveness undoubtedly exists. This is particularly significant as healthcare providers and policy makers consider effectiveness research to be more pertinent for healthcare decisions (Singal, Higgins and Waljee 2014). The topic of postpartum health has been mildly explored by researchers, doctors, and women themselves, as indicated by systematic review studies conducted by Weis et al. (2020), Weis et al. (2021) and a cross-sectional online survey by Yuen et al. (2013). The severity and prevalence of postpartum low back pain (PLBP) has been shown to compromise and decrease the capacity of a new mother to return to a productive life after delivery (To and Wong 2003 Bergström *et al.* 2016). As reported by Peterson, Haas and Gregory (2012), postpartum low back pain can persist up to six years, resulting in co-morbidities that range from chronic insomnia to post-natal depression. This therefore warrants the need for treatment modalities that can effectively resolve postpartum low back pain and its related morbidities. The issue of effectively resolving postpartum low back pain and its related morbidities, especially via chiropractic manipulation and mobilisation, in postpartum populations was not consistently evident across all studies included in by Weis *et al.* (2020) and Weis *et al.* (2021). The specific areas studied were not always clearly outlined, as discrepancies between terms such as “postpartum” verse “pregnancy-related”, and the interchanged use of the LBP verses PGP locutions, in studies where such may have potentially distorted the results, were identified. Therefore, the task of identifying therapy choices that are both safe and effective for postpartum low back pain sufferers presented a significant challenge. Currently, research has not conclusively determined the appropriateness of chiropractic care for the postpartum period. The objective of this study is to assess and synthesise the current body of data about the therapeutic effectiveness of chiropractic manipulation and mobilisation in treating postpartum low back pain.

A recent systematic review conducted by Weis et al (2020), submitted in 2019, included studies up to October 2016. The objective of the SR was to assess effectiveness of

specific chiropractic care options commonly used for postpartum LBP, PGP or a combination of both. Weis et al (2020) included all manual treatments offered by varying practitioners including physiotherapists and osteopaths. Additionally, only published studies in peer-reviewed journals were included with no grey literature. Case reports were also excluded. Furthermore, studies which also focused on other types of chiropractic care (i.e. modalities regularly used by chiropractors such as TENS) were included. The main focus of this study was on manipulation performed by chiropractors and mobilisation conducted by chiropractors only.

Our current SR did initial searches on multiple databases for studies dating back 20 years till 2021. Subsequent searches carried out a year later searched for studies up to January 2023.

It is imperative to note that, in as much as there are similarities in manual treatments amongst physiotherapists, osteopaths and chiropractors, there are key paradigmatic and technical variations between them (Myburgh, Larsen and Hartvigsen 2008; Thomson 2013). Chiropractic is a component of the Biopsychosocial Model of healthcare, which adheres to a patient-centred treatment approach. This method emphasises a comprehensive understanding of the patient and seeks to examine, mitigate, and pre-empt diseases (Bello 2012; van Dulmen *et al*. 2013; Gliedt *et al*. 2017; Ravidutt 2022). On the other hand, physiotherapy is classified under the framework of the Biomedical Model of healthcare, which is characterised by a disease centred approach to delivering healthcare (Bello 2012; van Dulmen *et al*. 2013; Gliedt *et al*. 2017; Ravidutt 2022). The biomedical model adheres to a reductionist methodology in the provision of patient treatment. The greatest distinguishing element of osteopathy is its emphasis on somatic dysfunction as it relates to structure, as treated by osteopathic practitioners employing osteopathic manipulative treatment (Johnson and Kurtz 2002). Additionally, there are technical distinctions in the manner in which their high-velocity low-amplitude (HVLA) thrusts are administered (Vickers and Zollman 1999).

Chiropractors often use manual techniques including the application of pressure on specific vertebrae using their hands, whereas osteopaths typically utilise limb-based levered thrusts. (Vickers and Zollman 1999). Additionally, osteopathic practise encompasses a notable array of visceral techniques that are distinct and cannot be

overlooked. The purpose of these techniques is to address and alleviate mobility problems that may be detected by palpation in the abdominal viscera, and then managed with manipulation. According to the World health Organization in 2010, osteopathic visceral techniques are purportedly used as a standard practice within the field of osteopathy (Grace, Fleischmann and Vaughan, 2021). Grace, Fleischmann and Vaughan (2021) also discovered that out of the total sample size of 137 osteopaths, who participated in the study, a majority of 98 individuals (72%) indicated their use of osteopathic visceral techniques.

These critical differences in types of manipulation and mobilisation therapies assessed for their efficacy or effectiveness_in treating postpartum low back pain in previous individual studies and SRs, highlight the importance of considering the true representation of chiropractic manipulation and mobilization and its efficacy or effectiveness in the treatment of low back pain/ pelvic girdle pain in postpartum women.

Grey Literature

Our search for studies encompassing our inclusion criteria to determine efficacy or effectiveness of chiropractic manipulation and mobilisation to treat postpartum low back/ pelvic girdle pain, generated three RCTs that were never published nor peerreviewed. These were generated through postgraduate research and are classified as grey literature. Grey literature refers to documents and research materials that are not traditionally published through commercial or academic publishing channels. This type of literature is typically produced by organizations, government agencies, institutions, and individuals but doesn't undergo the same formal peer-review process as scholarly journal articles or books (Rothstein & Hopwell 2009; Cooper, Hedges and Valentine 2019). Grey literature is called "grey" because it often falls outside the mainstream or official publication processes and can be more challenging to access and locate. It includes various types of materials, such as: Theses and Dissertations: While these are considered scholarly works, they are not always published in traditional journals or books (Rothstein & Hopwell 2009; Mering 2018; Cooper, Hedges and Valentine 2019).

Our reason for including grey literature as opposed to previous SRs which did not, was its value in providing important insights and information, especially when conventional sources of research may be limited or absent (Paez 2017: 233-240). Researchers often use grey literature to gather additional data, background information, or alternative viewpoints on a particular subject (Pappas and Williams 2011). However, because grey literature isn't subject to the same quality control measures as peer-reviewed publications, it should be critically evaluated for its validity and reliability (Pappas and Williams 2011).

We also included case reports in our SR. Case reports have a distinct role in advancing medical science (Vandenbrouke 2001). They enable the identification of new diseases and unanticipated outcomes (both negative and positive), as well as the examination of underlying mechanisms, and they have a significant impact on medical directive (Vandenbrouke 2001). In relation to the postpartum low back pain cases reported in this study; the presentation, case histories, signs and symptoms of the patients' may have been similar but also presented unique aspects (e.g. sacroiliac joint syndrome versus pubic symphysis diastasis). The variations in the type of postpartum low back required tailored chiropractic treatment and management for the respective cases. Case reports are able to hone into the customization of each case, thus providing detailed protocols that may be considered for future re-occurring cases.

5.2 Summary of evidence

In our search for evidence, we found 4 RCTs spanning 17 years (February 2002 to October 2019). We found from our analyses, that the overall methodological quality of these RCTs investigating chiropractic mobilisation and manipulation for postpartum low back pain to be inadequate.

This was due to all 4 RCTs projecting a high level of risk of bias, with no blinding in 2 of the RCTs (Pritchard 2001; Rosenberg 2008) and selective blinding in the remaining 2 RCTs. Additionally, the studies exhibited heterogeneity in terms of dosage, duration, and techniques employed, with treatments changing across different trials, thus pointing to the inconsistency with regards to the certainty of evidence. Additionally, there was

variation in the duration of postpartum low back pain among the individuals included in the different studies. The source populations and participant recruitment appear to align with the target population of the study, thus demonstrating generalizability within the context of the particular study population, in the respective studies. However, there is insufficient demographic description of the patients, which hinders the ability to extrapolate the findings to real-life settings, thereby impacting the applicability to postpartum low back population at large.

The studies in this SR have demonstrated the safety of chiropractic mobilisation and manipulation. Gausel *et al*. (2019), a published study, reported no serious long last adverse effects, with three women in the therapy group experienced transient tenderness following the latter treatment. Rosenburg (2008) did not mention any adverse effects and neither did Wilson (2006) nor Pritchard (2001). Small sample sizes and the inclusion of further dropouts led to a reduced sample size, with only 11 participants remaining in the intervention group was a noted limitation in the study by Gausel *et al.* 2019). The authors of this study noted that the patient numbers were small as there was a low number of women with persistent dominating 1-sided PGP 36 months postpartum (Gausel *et al.* 2019). This leads to the question of whether or not persistent PGP after pregnancy is infrequent. In the initial cohort study, from which participants were selected for this intervention trial, it was observed that a mere 16% of individuals had chronic PGP within the timeframe of 3 to 6 months following childbirth (Gausel *et al.* 2019). Furthermore, it should be noted that the dominance of the 1sided PGP is limited to a certain subset, namely one of the five PGP subgroup (Gausel *et al.* 2019).

Pritchard (2001) also documented limitations with regards sample size which was further impacted by dropout rates as well. Pritchard (2001) went on to recommend larger sample sizes that will also allow for specific demographic grouping thus further increasing the study's validity. Rosenberg (2008) had similar limitations to Gausel *et al*. (2019) and Pritchard (2001). Overall, risk of bias was high for the RCTs which negatively impacted the strength of the literature supporting chiropractic manipulation and mobilisation in postpartum women.

We included 4 case reports between the periods 2011 to 2017 that met our inclusion criteria in this SR evidence synthesis. It is imperative to consistently note that while the evidence from the CRs is robustly presented, it is grey literature and the quality of evidence from CRs is inferior to that of RCTs. Evidence from case reports (CRs) provided value and reliability in some respects, but lacked crucial information in other aspects, thus affecting the extent of generalizability of the outcomes. Although all the case reports clearly described some patient demographics such as age, sex, medical history, diagnosis, as well as past and current diagnostic test results; clear and detailed demographic information such as race, prognosis, medications, setting and context, as well as previous treatments either lacked or was overlooked. The patients' history, including their medical histories, were adequately documented throughout the case reports, however relevant past interventions and their outcomes were insufficient. Referral from other healthcare providers was mentioned but a complete description of how the patient was managed by these healthcare providers, prior their referral, would have been advantageous. Family and psychosocial history including relevant genetic information was omitted throughout. The exclusion of some of the aforementioned elements may potentially restrict the overall comprehensiveness of the argument regarding effective outcomes. A comprehensive account of the patients' clinical status was provided, including a detailed description of each case. This account included an exploration of the distinctive nature of the ailment or disease, an analysis of the symptoms experienced, as well as an examination of the frequency and intensity of these symptoms. The case reports, however, did not indicate whether differential diagnoses were taken into consideration. The case reports included comprehensive details about the assessment process used to evaluate the patient.

All necessary tests were requested to validate the diagnosis, therefore the case reports included a thorough account of the different diagnostic tests used, including both gold standard and alternative methods. Regarding subjective evaluations, patients also provided reports on the diagnostic and outcome measures. In the case report by Fano and Mullin (2013), the patients' subjective ratings were not documented using any specific validated or standardised pain, disability, or quality of life questionnaires. When deemed suitable, visual aids such as photographs or graphics depicting diagnostic processes, radiography, or therapy procedures were used to effectively communicate

information. The therapy and intervention regimens were well delineated throughout the studies, however the omission of probable adverse effects in all the case reports is notable. The clinical outcomes after the intervention were effectively characterised in terms of the presence or absence of symptoms. The results of the management and therapy were visually represented via the use of either graphics or figures, aiding in the effective communication of the information in all of the CRs; except for the study by Gregory and Rowell (2011). In 1 of the case reports however in was noted that despite the specification of the post-intervention clinical state, a more thorough chiropractic examination, such as a full Postural Restoration System (PR) study, would have provided stronger evidence to substantiate the results seen after the intervention, as it was mentioned to have been conducted before the intervention (Hoying & Alcantara 2017). The adverse occurrences were entirely disregarded, since they were not recorded nor taken into account in any of the case reports. Insufficient identification and description of adverse events or unanticipated events resulted in report deficits. Each case report included in this study offers useful insights and clinical practise guidelines for doctors who encounter similar cases, so enhancing their understanding and informing their decision-making process.

Gregory and Rowell (2011) documented dearth of literature on the effects of chiropractic care on postpartum pelvic pain and mentioned more research is needed. There was an undeniable scarcity of literature regarding chiropractic care and back pain for postpartum women as well as a lack of consistency among the terms LBP, PGP and combination pain (Weis *et al.* 2020). All included case reports overlooked adverse events of unanticipated events in each of their studies. This created a gap and deficit in the studies thus affecting the quality of the case reports' literature. The heterogeneity in the results also limited the viability of a meta-analysis in this SR. Also, within the framework of the post-positivist paradigm in research, it is imperative to recognise the limited applicability of the current case reports owing to many factors that may confound the results (Hoying and Alcantara 2017). These factors include placebo effects, the natural progression of the phenomenon under investigation, subjective validation, and potential biases exhibited by the patients involved (Hoying and Alcantara 2017).

The overall take home lesson from the CRs was that manipulation and mobilisation showed improvement, however 3 of the 4 CRs indicated improvement with adjunctive therapies and aid, as none of the 3 used manipulation and or mobilisation as interventions on their own. These adjunctive and aiding therapies included a walker for ambulatory difficulty, exercises and heel lift as reported by Fano and Mullin (2013). Gregory and Howell (2011) included myofascial release in their intervention; while Henry (2015) employed trigger point release, electrical stimulation, moist heat, sacroiliac belt, and specific stabilizing exercises. Hoying and Alcantara (2017) however reported improvements, utilizing high velocity low amplitude thrust adjustments supplemented by with drop table technique, without any adjunctive therapy nor aid. Case reports are generally considered to be the weakest form of evidence, however, if there are multiple CRs demonstrating similar efficacies they cannot be disregarded, especially in the absence of high-quality evidence. It is therefore vital to consider evidence from these reports. Despite the limitations, there was a moderate degree of evidence in support of chiropractic manipulation and mobilisation in postpartum women. Nevertheless, within the constructivist tradition, scholarly inquiry places significant emphasis on the interpretation and significance of the human experience. In light of this, it can be argued that case reports are aligned with our understanding of patient and clinical experiences, thus serving as a foundation for drawing general conclusions. Moreover, case reports contribute to our belief in the effectiveness of chiropractic treatment for comparable patients, such as women experiencing low back pain during the post-partum period, as exemplified in this particular case report (Hoying and Alcantara 2017).

5.3 Limitations

EMBASE and other extensive databases were excluded due to their lack of accessibility and financial limitations. This could have led to the potential omission of several studies.

This analysis included a substantial amount of grey literature and a limited number of peer-reviewed published articles. There was clearly a scarcity of published, peerreviewed studies thus steering data collection into the direction of grey literature as well as studies that included adjunctive therapies. The sample sizes as well as the heterogeneity among the available literature emitted difficulties in the generalizing and

application of the results of this study. The heterogeneity in the dosages, techniques, sample sizes and duration of the studies and interventions limit the accuracy and reliability of the existing literature. This study also revealed that the quality of the methodologies of the existing respective RCTs was not of the highest quality as Pritchard's and Rosenberg's studies lacked optimal blinding, while not adequately reporting on whether adverse effects were accounted for or not. This study therefore found that there was a high risk of bias of the existing literature thus providing limitations in in supporting the effectiveness or even the efficacy of chiropractic manipulation and mobilization in postpartum low back pain. Also, All studies were to be in English to avoid misinterpretation and ambiguity (Cormier 2017; Walpole 2019: 127-134; Nasri, Nasri and Talib 2021: 15-28). This is a common limitation when review studies are conducted as it requires more financial capacity along with linguistic specialists to avoid any inaccuracies and inadequacies especially during data collection (Walpole 2019: 127134).

5.4 Conclusion

While most of the evidence available provided some valuable clinical insight, with regards to chiropractic manipulation and mobilization for low back pain in post-partum women, the quality of the evidence was low to moderate at most. The review findings do not support the notion that chiropractic manipulation and mobilization are superior to alternative treatments provided by chiropractors for postpartum low back pain and pelvic girdle pain. In this particular demographic, these chiropractic manual therapies can be considered as potential interventions aimed at alleviating low back discomfort or distress encountered. Given the challenges faced by primary healthcare practitioners in addressing pain management among these specific populations, it is imperative for healthcare professionals to possess the necessary skills to accurately identify and employ the most efficacious treatment approaches in order to provide optimal care for these individuals.

A dearth of literature on chiropractic manipulation and mobilization in post-natal females was illuminated by this SR. This highlights the necessity for doing research of higher quality and sturdiness within this particular demographic. This would include future

studies being intentional about recruiting larger diverse sample sizes, adequately reporting on dropouts, thorough blinding as well as objectively considering adverse effects. Studies which are able to access financial and/or specialized skill sets should consider including non-English studies to help combat the limited English literature available (Walpole 2019: 127-134). Also, a large number of the relevant literature was older than 5 years, with some literature dating as far back as 20 years thus placing emphasis on the need for more updated studies. It was also clear that there were irregularities regarding the usage of the LBP term and what this term clinically encompasses. It is with utmost essentiality that such discrepancies are cleared by creating a more solid and intentional guideline or definition of this term. By outlining clearer definitions of such terms, future research potentially becomes less skewed thus improving the accuracy. It is also recommended that a focus into producing more studies of this demographic, should consider RCTs as they hold more weight within the medical fraternity. The RCTs should carry larger sample sizes which include a variety of demographic characteristics (race, socioeconomic status, age, etc.), as this will heighten the generalizability of the study. Blinding should be prioritized in future studies, while the considerations for dropouts of participants and adverse effects ought to be clearly documented.

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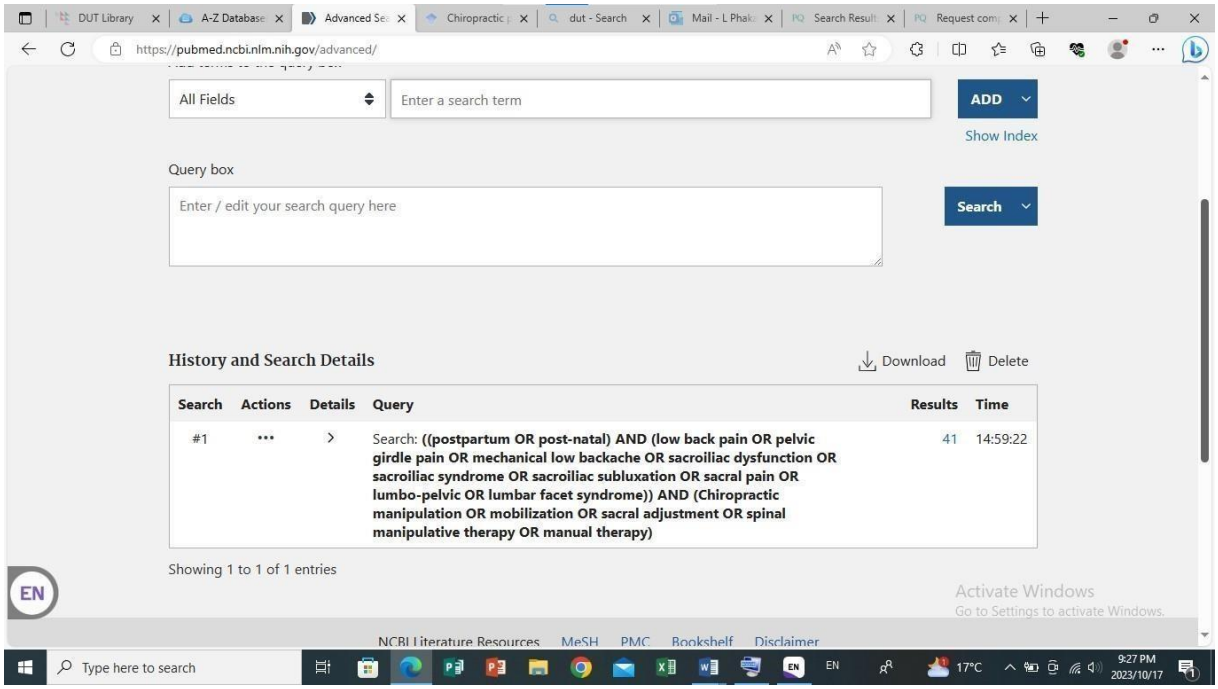
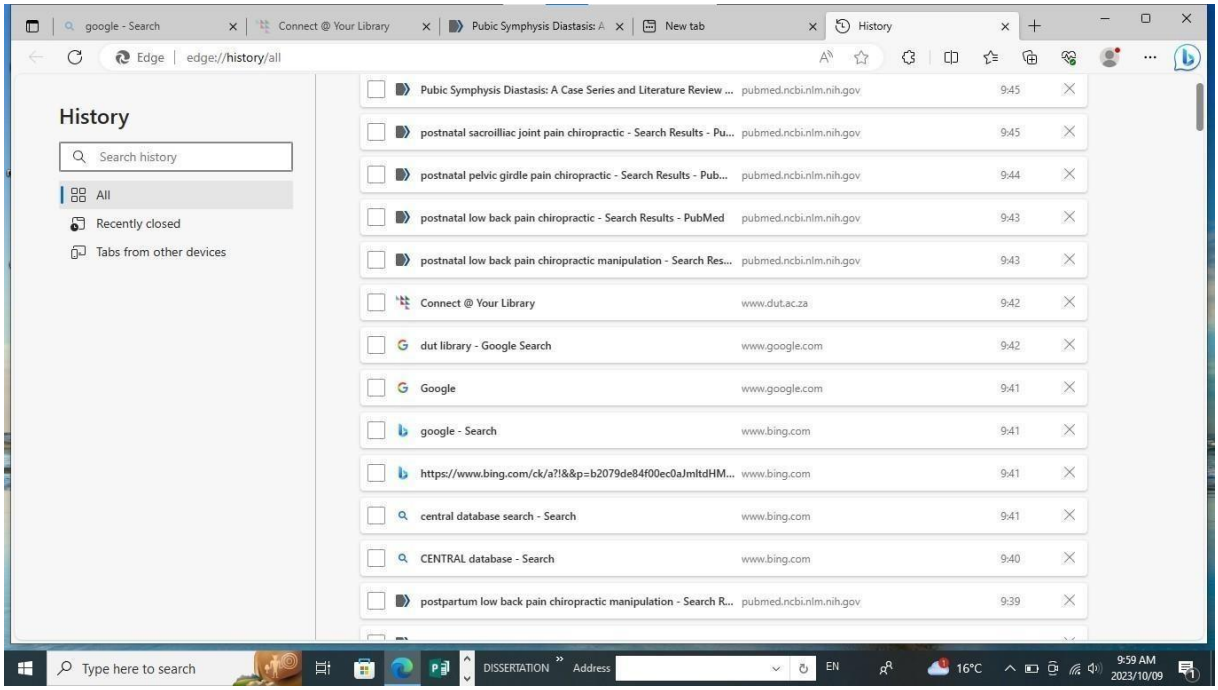
APPENDICES

Appendix A Search history





Appendix B PRISMA Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			

Title	1	Identify the report as a systematic review, metaanalysis, or both.	
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	

Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	

Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the metaanalysis).	
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each metaanalysis.	

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, metaregression), if done, indicating which were prespecified.	
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	

Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	

Appendix C- (C1-C4) Reviewer LP

JBI Critical Appraisal Checklist for Case Reports

Reviewer: LP Date: 25-10-2023

Author: Fano and Mullin 2013 Year: 2023

Record Number: C1

			Not
1. Were patient's demographic characteristics clearly described?	☐	☐	☐ X
2. Was the patient's history clearly described and presented as a timeline?	☐	☐	☐ X
3. Was the current clinical condition of the patient on presentation clearly described?	☐	☐	☐ X

☐ ☐ ☐

4. Were diagnostic tests or assessment methods and X the results clearly described?

☐ ☐ ☐

5. Was the intervention(s) or treatment procedure(s) X clearly described?

☐ ☐ ☐

6. Was the post-intervention clinical condition clearly X described?

7. Were adverse events (harms) or unanticipated ☐ X ☐ ☐ events identified and described?

8. Does the case report provide takeaway lessons? X ☐ ☐ ☐

Sacroiliac joint movements along with strengthening exercises may significantly improve such patients. It may take more than 5 months for chiropractic care to restore the patient, however the study indicated that impact of Chiropractic care was still evident a year later.

JBI Critical Appraisal Checklist for Case Reports

Reviewer: LP Date: 25-10-2023

Author: Gregory and Rowell Year: 2023 Record Number: C2

Not

☐ ☐ ☐

1. Were patient's demographic characteristics clearly X described?

☐ ☐ ☐

2. Was the patient's history clearly described and X presented as a timeline?

☐ ☐ ☐

3. Was the current clinical condition of the patient on X presentation clearly described?

☐ ☐ ☐

4. Were diagnostic tests or assessment methods and X the results clearly described?

☐ ☐ ☐

5. Was the intervention(s) or treatment procedure(s) X clearly described?

☐ ☐ ☐

6. Was the post-intervention clinical condition clearly X described?

X ☐ ☐

7. Were adverse events (harms) or unanticipated ☐ events identified and described?

8. Does the case report provide takeaway lessons? X ☐ ☐ ☐

The symptoms of the patient were mixed i.e. the patient had left low back pain above the hip even though orthopaedic and regional assessments detected that the SIJ was the source of her pain. Such amalgamations of symptoms may be frequent among postpartum patients. Postpartum pain may sometimes cease on its own, or may persist. Chiropractic treatment was therefore efficient in settling postpartum pain.

JBI Critical Appraisal Checklist for Case Reports

Reviewer: LP Date: 25-10-2023

Author: Henry 2015 Year: 2023 Record Number: C3

				Not
1. Were patient's demographic characteristics clearly described?	☐	☐	☐	X
2. Was the patient's history clearly described and presented as a timeline?	☐	☐	☐	X
3. Was the current clinical condition of the patient on presentation clearly described?	☐	☐	☐	X

☐ ☐ ☐

4. Were diagnostic tests or assessment methods and X the results clearly described?

☐ ☐ ☐

5. Was the intervention(s) or treatment procedure(s) X clearly described?

☐ ☐ ☐

6. Was the post-intervention clinical condition clearly X described?

X ☐ ☐

7. Were adverse events (harms) or unanticipated ☐ events identified and described?

8. Does the case report provide takeaway lessons? X ☐ ☐ ☐

As much as chiropractic treatment indicated improvement, chiropractic interventions can cooperate well with other with other healthcare interventions or consultations, i.e.

midwives, obstetricians, etc. This collaboration can yield significant results in managing and improving patients with postpartum pubic symphysis diastasis.

JBI Critical Appraisal Checklist for Case Reports

Reviewer: LP Date: 25-10-2023

Author: Hoying and Alcantara Year: 2023

Record Number: C4

			Not
1. Were patient's demographic characteristics clearly described?	☐	☐	☐
2. Was the patient's history clearly described and presented as a timeline?	X	☐	☐
3. Was the current clinical condition of the patient on presentation clearly described?	☐	☐	☐
4. Were diagnostic tests or assessment methods and the results clearly described?	X	☐	☐

☐ ☐ ☐

5. Was the intervention(s) or treatment procedure(s) clearly described? X

☐ ☐ ☐

6. Was the post-intervention clinical condition clearly described? X

X ☐ ☐

7. Were adverse events (harms) or unanticipated events identified and described? ☐

8. Does the case report provide takeaway lessons? X ☐ ☐ ☐

Postpartum low back pain may be prolonged. In this case, the patient had it for years. It could also be noted that how much potential impact foetal-pelvic disproportion has on

pelvimetry. This study therefore indicated that chiropractic manipulation was a very viable intervention for managing and treating the collateral low back pain.

This study also weighed in on the benefits of case reports and how they gave a more individualised insight into the patients experiences with given interventions.

Appendix C (C5-8) Reviewer YT

JBI Critical Appraisal Checklist for Case Reports

Reviewer YT Date

Author Fano Year 2013

	Yes
1. Were patient's demographic characteristics clearly described?	
2. Was the patient's history clearly described and presented as a timeline?	☐
3. Was the current clinical condition of the patient on presentation clearly described?	X
4. Were diagnostic tests or assessment methods and the results clearly described?	X
5. Was the	X

intervention(s) or treatment procedure(s) clearly described? X

Record Number C5

No ☐ Unclear ☐ Not applicable ☐

6. Was the post-intervention clinical condition clearly described? X ☐ ☐

7. Were adverse events (harms) or unanticipated events identified and described? ☐ ☐ X ☐

8. Does the case report provide takeaway lessons? ☐ ☐ ☐

11/10/23

Overall appraisal: Include X ☐ Exclude ☐ Seek further info ☐ ☐ X ☐

☐ ☐ ☐

☐

Comments (Including reason for exclusion)

No information on any concurrent treatment that the patient could possibly be taking or other treatments received.

JBI Critical Appraisal Checklist for Case Reports

Reviewer YT

Author Gregory

:

1. Were patient's demographic characteristics clearly described?

2. Was the patient's history clearly described and presented as a timeline?

3. Was the current clinical condition of the patient on presentation clearly described?

condition clearly described?

Date 11/10/23

Year 2011 Record Number: C6 Yes

4. Were diagnostic tests or assessment methods and the results clearly described?

No Unclear Not applicable

5. Was the intervention(s) or treatment procedure(s) clearly described?

7. Were adverse events (harms) or unanticipated events identified and described?

6. . Was the postintervention clinical

☐ X ☐ ☐ X ☐☐ ☐

☐ X ☐ ☐ ☐ X ☐ ☐

☐ X ☐ ☐ ☐ X ☐ ☐

☐ ☐ X ☐ ☐ X ☐ ☐

☐

8. Does the case report provide takeaway lessons?

Overall appraisal: Include X ☐

Exclude ☐

Seek further info

☐

Comments (Including reason for exclusion)

150

Information on weight and height missing – may impact on pelvic girdle pain.

Follow up information was after 4 months

JBI Critical Appraisal Checklist for Case Reports

Reviewer YT

Author Henry 2015

Date 11/10/23

Year 2011 Record Number: C7

	Yes	No	Unclear	Not applicable
1. Were patient's demographic characteristics clearly described?	X			
2. Was the patient's history clearly described and presented as a timeline?				X
3. Was the current clinical condition of the patient on presentation clearly described?	X			
4. Were diagnostic tests or assessment methods and the results clearly described?		X		
5. Was the intervention(s) or treatment procedure(s) clearly described?		X		
6. Was the postintervention clinical condition clearly described?	X			
7. Were adverse events (harms) or		X		
8. unanticipated events identified and described?		X		
9. Does the case report provide takeaway lessons?	X			

Overall appraisal: Include **X** ☐ Exclude ☐ Seek further info

☐

Comments (Including reason for exclusion)

Patient was also on NSAIDs

There was no follow up information beyond the 14 weeks

JBI Critical Appraisal Checklist for Case Reports

Reviewer YT

Author Hoying and Alcantara 2017

Year 2011 Record Number: C8

Date 11/10/23

	Yes	No	Unclear	Not applicable
10. Were patient's demographic characteristics clearly described?	☐	X	☐	☐
11. Was the patient's history clearly described and presented as a timeline?	☐	X	☐	☐
12. Was the current clinical condition of the patient on presentation clearly described?	☐	X	☐	☐
13. Were diagnostic tests or assessment methods and the results clearly described?	☐	☐	X	☐
14. Was the intervention(s) or treatment procedure(s) clearly described?	☐	☐	X	☐
15. Was the postintervention clinical condition clearly described?	☐	X	☐	☐
16. Were adverse events (harms) or unanticipated events identified and described?	☐	X	☐	☐

17. Does the case report provide takeaway lessons?

Overall appraisal: Include ☒ ☐ Exclude ☐ Seek further info

☐

Comments (Including reason for exclusion)

Information on weight and height missing – may impact on pelvic girdle pain.

There was no follow up information

There was no information on concomitant treatments

Radiographic assessment changed in 6 days (72%)

Appendix E The Independent Reviewers' Data Extractions with RevMan Risk of Bias Tool for RCTs and

Appendix G Memorandum of Agreement MOA

Reviewer 1- Dr R White (RW)

Review title or ID	Adding Chiropractic Treatment to Individual Rehabilitation for Persistent Pelvic Girdle Pain 3 to 6 Months After Delivery: A Pilot Randomized Trial

Study ID *(surname of first author and year first full report of study was published e.g. Smith 2001)*	Gausel et al 2019
Report ID	Gausel et al Journal of Manipulative and Physiological Therapeutics Persistent Pelvic Girdle Pain Treatment October 2019
Report ID of other reports of this study including errata or retractions	
Notes	

1. General Information

Date form completed *(dd/mm/yyyy)*	24/07/2023
Name/ID of person extracting data	Dr RH White
Reference citation	Gausel et al 2019
Study author contact details	
Publication type *(e.g. full report, abstract, letter)*	Randomized trial
Notes:	

2. Study eligibility

Study Characteristics	Eligibility criteria *(Insert inclusion criteria for each characteristic defined in the Protocol)*	Eligibility criteria met? Yes No Unclear	Location in text or source *(pg & ¶/fig/table/other)*

Type of study	Randomised Controlled Trial	X	
	Quasi-randomised Controlled Trial	X	
	Controlled Before and After Study Contemporaneous data collection Comparable control sites At least 2 x intervention and 2 x control clusters	X	
	Interrupted Time Series At least 3 time points before and 3 after the intervention Clearly defined intervention point	X	
	Other design (specify):		

Participants		X	
Types of intervention		X	
Types of comparison		X	
Types of outcome measures		X	
INCLUDE X		EXCLUDE —	

Reason for exclusion	
Notes:	

	Descriptions as stated in report/paper	**Location in text or source** *(pg & ¶/fig/table/other)*
Aim of study *(e.g. efficacy, equivalence, pragmatic)*	To investigate the feasibility of conducting a randomized clinical trial on the impact of adding chiropractic treatment to individual rehabilitation for women with persistent 1-sided PGP 3 to 6 months after delivery.	601

Design *(e.g. parallel, crossover, non-RCT)*	Parallel RCT	
Unit of allocation *(by individuals, cluster/ groups or body parts)*	Persistent, dominating 1-sided PGP	601
Start date	3-6 months post delivery	
End date	Undisclosed	
Duration of participation *(from recruitment to last follow-up)*	20 weeks	602
Ethical approval needed/ obtained for study	X Yes ☐ No ☐ ıclear	

Notes:

1.2 Participants

	Description *Include comparative information for each intervention or comparison group if available*	Location in text or source *(pg & ¶/fig/table/other)*
Population description *(from which study participants are drawn)*	Women with persistent dominating 1-sided pelvic girdle pain (PGP) 3 to 6 months after delivery	601
Setting *(including location and social context)*	Women were recruited from outpatient clinic at Stavanger University Hospital, Norway and in a private chiropractic clinic in Stavanger	601

Inclusion criteria	Persistent dominating 1-sided pelvic girdle pain		601
Exclusion criteria	Low back pain only		601
Method of recruitment of participants *(e.g. phone, mail, clinic patients)*	Hospital and clinic patients		601
Informed consent obtained	X Yes ___ __nclear No		
Total no. randomised *(or total pop. at start of study for NRCTs)*	569		601
Clusters *(if applicable, no., type, no. people per cluster)*	Individualized rehabilitation and chiropractic treatment Individualized rehabilitation alone		
Baseline imbalances	low		

Withdrawals and exclusions *(if not provided below by outcome)*	9	
Age	Average 31	
Sex	Female	
Race/Ethnicity	Undisclosed	
Severity of illness	Sub-acute to chronic	
Co-morbidities	Undisclosed	
Other relevant sociodemographics	Undisclosed	
Subgroups measure	11	
Subgroups reported	6 & 5	
Notes:		

1.3 Intervention groups **Intervention Group 1**

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*
Group name	Individualized rehabilitation and chiropractic treatment	603
No. randomised to group *(specify whether no. people or clusters)*	6	603

Theoretical basis *(include key references)*	All key references available pg 606-607	606-607
Description *(include sufficient detail for replication, e.g. content, dose, components)*		
Duration of treatment period	October 2009 until May 2010.	
Timing *(e.g. frequency, duration of each episode)*	4 to 12 treatments in 20 week period	
Delivery *(e.g. mechanism, medium, intensity, fidelity)*	Manipulation, mobilization, soft tissue treatment	
Providers *(e.g. no., profession, training, ethnicity etc. if relevant)*	Chiropractor	
Co-interventions	Individualized rehabilitation	
Economic information *(i.e. intervention cost, changes in other costs as result of intervention)*	Undisclosed	
Resource requirements *(e.g. staff numbers, cold chain, equipment)*	Undisclosed	
Integrity of delivery	Good	
Compliance	Good	

Notes:

1.4 Outcomes **Outcome 1**

	Description as stated in report/paper	Location in text or source *(pg & /fig/table/other)*
Outcome name	Disability	

Time points measured *(specify whether from start or end of intervention)*	Start to end	
Time points reported	From before and after intervention	
Outcome definition *(with diagnostic criteria if relevant)*	Oswestry Disability Index, EuroQol-5D, numeric rating scale, Pelvic Girdle Questionnaire	

Person measuring/ reporting	Consulting chiropractor	
Unit of measurement *(if relevant)*	Numerical value	
Scales: upper and lower limits *(indicate whether high or low score is good)*	Lower score is good	
Is outcome/tool validated?	X Yes ☐ No ☐ clear	
Imputation of missing data *(e.g. assumptions made for ITT analysis)*	Undisclosed	
Assumed risk estimate *(e.g. baseline or population risk noted in Background)*	Undisclosed	
Power *(e.g. power & sample size calculation, level of power achieved)*	Small sample size	
Notes:		

1.5 Other

Study funding sources *(including role of funders)*	No external funding	
Possible conflicts of interest *(for study authors)*	Undisclosed	
Notes:		

Risk of Bias assessment

Domain	Risk of bias Low High Unclear	Support for judgement *(include direct quotes where available with explanatory comments)*	Location in text or source *(pg & ¶/fig/table/other)*
Random sequence generation *(selection bias)*	X ☐ ☐	Closed envelopes handed out by examining chiropractor	604
Allocation concealment *(selection bias)*	X ☐ ☐		604
Blinding of participants and personnel *(performance bias)*	☐ X ☐	Outcome group: All/ both groups of underwent interventions, and moreover, the same type intervention: individualized rehabilitation	605

(if separate judgement by outcome(s) required)	X	Outcome group:	
Blinding of outcome assessment *(detection bias)*	X	Outcome group: All/	
(if separate judgement by outcome(s) required)	X	Outcome group:	
Incomplete outcome data *(attrition bias)*	X	Outcome group: All/	
(if separate judgement by outcome(s) required)	X	Outcome group:	
Selective outcome reporting? *(reporting bias)*	X		

Other bias	X		
Notes:			

Data and analysis

Dichotomous outcome

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/ other)*
Comparison	N/A	

Outcome	N/A				
Subgroup	N/A				
Time point *(specify from start or end of intervention)*	N/A				
Results	Intervention		Comparison		
	No. with event	Total in group	No. with event	Total in group	
Any other results reported *(e.g. odds ratio, risk difference, CI or P value)*	N/A				
No. missing participants	None				

Reasons missing	N/A		
No. participants moved from other group	N/A		
Reasons moved	N/A		
Unit of analysis *(by individuals, cluster/groups or body parts)*	N/A		
Statistical methods used and appropriateness of these *(e.g. adjustment for correlation)*	N/A		
Reanalysis required? *(specify, e.g. correlation adjustment)*	Yes X No Unclear		
Reanalysis possible?	Yes X No Unclear		
Reanalysed results			
Notes:			

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*
Comparison	Disability in persistent pelvic girdle pain	
Outcome	Good	
Subgroup		

Continuous outcome

Time point *(specify from start or end of intervention)*	October 2009-May 2010	

Post-intervention or change from baseline?	Undisclosed						
Results	Intervention			Comparison			
	Mean	SD *(or other variance, specify)*	No. participants	Mean	SD *(or other variance, specify)*	No. participants	
			6			5	

Any other results reported *(e.g. mean difference, CI, P value)*	Undisclosed		
No. missing participants	None		
Reasons missing	N/A		
No. participants moved from other group	None		
Reasons moved	N/A		
Unit of analysis *(individuals, cluster/ groups or body parts)*	Individuals		
Statistical methods used and appropriateness of these *(e.g. adjustment for correlation)*	SPSS (IBM SPSS Statistics version 24) (IBM Corp, Armonk, New York) Descriptive statistics are given as means and standard deviations (SDs) and as counts and percentages. The clinical outcomes before and after the intervention are presented as means and range, mean change, and CIs		
Reanalysis required? *(specify)*	Yes X No Unclear		
Reanalysis possible?	Yes X No Unclear		

Reanalysed results	N/A		
Notes:			

Other outcome

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*
Comparison	N/A	
Outcome	N/A	
Subgroup	N/A	

Time point *(specify from start or end of intervention)*	N/A		
No. participant	Intervention	Control	

	N/A		N/A		
Results	Intervention result	SE (or other variance)	Control result	SE (or other variance)	
	Overall results		SE (or other variance)		
Any other results reported	N/A				
No. missing participants	N/A				
Reasons missing	N/A				
No. participants moved from other group	N/A				
Reasons moved	N/A				
Unit of analysis *(by individuals, cluster/groups or body parts)*	N/A				

Statistical methods used and appropriateness of these	N/A		
Reanalysis required? *(specify)*	X No Yes Unclear		
Reanalysis possible?	X s Unclear Ye No		
Reanalysed results	N/ A		
Notes:			

Other information

	Description as stated in report/paper	**Location in text or source** *(pg & ¶/fig/table/other)*
Key conclusions of study authors	A low number of women with persistent PGP and a high dropout rate resulted in an insufficient number of women participating in the study	606

References to other relevant studies	All references pg 606-607	606-607
Correspondence required for further study information *(from whom, what and when)*	Future studies should include all subgroups of women with persistent PGP and should adhere to Guideline for Reporting Interventions on Spinal Manipulative Therapy: Consensus on Interventions Reporting Criteria List for Spinal Manipulative Therapy and the Consolidated Standards of Reporting Trials 2010 Statement.	
Notes:		

Review title or ID	Comparison of sacroiliac joint manipulation vs piriformis iceandstretch combined with sacroiliac joint manipulation on post-partum females suffering from sacroiliac syndrome.
Study ID *(surname of first author and year first full report of study was published e.g. Smith 2001)*	Pritchard 2001
Report ID	
Report ID of other reports of this study including errata or retractions	
Notes	

General Information

Date form completed *(dd/mm/yyyy)*	2 August 2023
Name/ID of person extracting data	Dr RH White
Reference citation	
Study author contact details	
Publication type *(e.g. full report, abstract, letter)*	Dissertation
Notes:	

Study eligibility

Study Characteristics	Eligibility criteria *(Insert inclusion criteria for each characteristic as defined in the Protocol)*	Eligibility criteria met? Yes	No	Unclear	Location in text or source *(pg & ¶/fig/table/other)*
Type of study	Randomised Controlled Trial	X			
	Quasi-randomised Controlled Trial			X	
	Controlled Before and After Study Contemporaneous data collection Comparable control sites	X			

	At least 2 x intervention and 2 x control clusters		
	Interrupted Time Series		
	At least 3 time points before and 3 after the intervention Clearly defined intervention point	X	
	Other design (specify):		
Participants		X	
Types of intervention		X	
Types of comparison		X	
Types of outcome measures		X	

INCLUDE X	EXCLUDE
Reason for exclusion	
Notes:	

Methods

	Descriptions as stated in report/paper		Location in text or source *(pg & ¶/fig/table/other)*
Aim of study *(e.g. efficacy, equivalence, pragmatic)*	Effectiveness of manipulation of a fixated SI joint on its own compared to sacroiliac joint manipulation combined with piriformis ice-stretch in post-partum females suffering from sacroiliac syndrome		
Design *(e.g. parallel, crossover, non-RCT)*	Parallel		
Unit of allocation *(by individuals, cluster/ groups or body parts)*	Individuals		
Start date	Undisclosed		
End date	Undisclosed		
Duration of participation *(from recruitment to last follow-up)*	4 weeks		IV
Ethical approval needed/ obtained for study	X Yes No nclear		

Notes:

Participants

	Description *Include comparative information for each intervention or comparison group if available*	Location in text or source *(pg & ¶/fig/table/other)*
Population description *(from which study participants are drawn)*	Post-partum females suffering from sacroiliac syndrome	
Setting *(including location and social context)*	Kempton Park Chiropractic and TWC clinic	

Inclusion criteria	Post-partum, over 18 years old, females suffering from sacroiliac syndrome	
Exclusion criteria	All exclusion criteria listed on pg 35	35

Method of recruitment of participants *(e.g. phone, mail, clinic patients)*	Gynaecologist referrals, post-natal and the Kempton Park chiropractic clinic.	
Informed consent obtained	X Yes ___ __nclear No	
Total no. randomised *(or total pop. at start of study for NRCTs)*	30	
Clusters *(if applicable, no., type, no. people per cluster)*	10 per group	
Baseline imbalances		
Withdrawals and exclusions *(if not provided below by outcome)*		
Age	Over 18	
Sex	Female	
Race/Ethnicity	Undisclosed	
Severity of illness	Subacute	
Co-morbidities	None	
Other relevant sociodemographics	Undisclosed	
Subgroups measure		
Subgroups reported		

Notes:

Intervention groups **Intervention**

Group 1

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*
Group name	Manipulation alone	
No. randomised to group *(specify whether no. people or clusters)*	10	
Theoretical basis *(include key references)*	Gatterman 1990:122 Haldeman 1992	
Description *(include sufficient detail for replication, e.g. content, dose, components)*	Chiropractic sacroiliac joint manipulation	
Duration of treatment period	2 weeks	
Timing *(e.g. frequency, duration of each episode)*	3 treatments per week	
Delivery *(e.g. mechanism, medium, intensity, fidelity)*	Chiropractic side posture manipulation of fixated sacroiliac joint	

Providers *(e.g. no., profession, training, ethnicity etc. if relevant)*	Chiropractor	
Co-interventions	None	
Economic information *(i.e. intervention cost, changes in other costs as result of intervention)*	None	
Resource requirements *(e.g. staff numbers, cold chain, equipment)*	None	
Integrity of delivery	Good	
Compliance	Good	
Notes:		

Outcomes

Outcome 1

	Description as stated in report/paper	Location in text or source *(pg & /fig/table/other)*
Outcome name	Subjective pain and disability Objective sacroiliac motion palpation	
Time points measured *(specify whether from start or end of intervention)*	Treatment 1,3,6 and 2 weeks post treatment	
Time points reported	Treatment 1,3,6 follow up 2 weeks	
Outcome definition *(with diagnostic criteria if relevant)*	McGill pain questionnaire, Oswestry Low Back Pain Disability questionnaire Provocative orthopaedic tests, Algometer/force dial	
Person measuring/ reporting	Author	
Unit of measurement *(if relevant)*		
Scales: upper and lower limits *(indicate whether high or low score is good)*		

Is outcome/tool validated?	X Yes ___ ___nclear No		
Imputation of missing data *(e.g. assumptions made for ITT analysis)*	None		
Assumed risk estimate *(e.g. baseline or population risk noted in Background)*	None		
Power *(e.g. power & sample size calculation, level of power achieved)*	30 sample size, 15 in each group		

Notes:

Other

Study funding sources *(including role of funders)*	None	
Possible conflicts of interest *(for study authors)*	None	

Notes:

Risk of Bias assessment

Domain	Risk of bia s Low High Unclear	Support for judgement *(include direct quotes where available with explanatory comments)*	Location in text or source *(pg & ¶/fig/table/other)*
Random sequence generation *(selection bias)*	X		
Allocation concealment *(selection bias)*	X		
Blinding of participants and personnel *(performance bias)*	X	Outcome group: All/	
(if separate judgement by outcome(s) required)		Outcome group:	
Blinding of	X	Outcome group: All/	

outcome assessment *(detection bias)*			
(if separate judgement by outcome(s) required)	☐ ☐ ☐	Outcome group:	
Incomplete outcome data *(attrition bias)*	☐ ☐ X	Outcome group: All/	
(if separate judgement by outcome(s) required)	☐ ☐ ☐	Outcome group:	
Selective outcome reporting? *(reporting bias)*	X		
Other bias	X		
Notes:			

Data and analysis

Dichotomous outcome

	Description as stated in report/paper		Location in text or source *(pg & ¶/fig/table/ other)*
Comparison	N/A		
Outcome	N/A		
Subgroup	N/A		
Time point *(specify from start or end of intervention)*			
Results	Intervention	Comparison	

	No. with event	Total in group	No. with event	Total in group	
Any other results reported *(e.g. odds ratio, risk difference, CI or P value)*					
No. missing participants					
Reasons missing					
No. participants moved from other group					
Reasons moved					

Unit of analysis *(by individuals, cluster/groups or body parts)*			
Statistical methods used and appropriateness of these *(e.g. adjustment for correlation)*			
Reanalysis required? *(specify, e.g. correlation adjustment)*	☐ Yes ☐ No ☐ Unclear		
Reanalysis possible?	☐ Yes ☐ No ☐ Unclear		
Reanalysed results			
Notes:			

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*
Comparison	Manipulation of fixated sacroiliac joint combine with icestretch of piriformis muscle	
Outcome	Objective and subjective pain and disability	
Subgroup		

Continuous outcome

Time point *(specify from start or end of intervention)*	Treatments 1,3,6 with 2 week post treatment follow up					
Post-intervention or change from baseline?	None					
Results	Intervention			Comparison		
	Mean	SD *(or other variance, specify)*	No. participants	Mean	SD *(or other variance, specify)*	No. participants

Any other results reported *(e.g. mean difference, CI, P value)*	None		
No. missing participants	None		
Reasons missing			
No. participants moved from other group	None		
Reasons moved			
Unit of analysis *(individuals, cluster/ groups or body parts)*	Individuals		
Statistical methods used and appropriateness of these *(e.g. adjustment for correlation)*	Paired t-tests Two sample t-test Sign rank test Mann Whitney test		
Reanalysis required? *(specify)*	X Ye s No clear U		
Reanalysis possible?	X N clear Yeso		
Reanalysed results			

Notes:

Other outcome

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*
Comparison		
Outcome		
Subgroup		

Time point *(specify from start or end of intervention)*		
No. participant	Intervention	Control

Results	Intervention result	SE (or other varianc e)	Contr ol result	SE (or other varianc e)
	Overall results		SE (or other variance)	
Any other results reported				
No. missing participants				
Reasons missing				
No. participants moved from other group				
Reasons moved				
Unit of analysis *(by individuals, cluster/groups or body parts)*				

Statistical method s used and appropriaten ess of these		
Reanalysis required? *(specify)*	Yes No nclear	
Reanalysis possible?	s Ye No nclear	
Reanalysed results		
Notes:		

Other information

	Description as stated in report/paper	**Location in text or source** *(pg & ¶/fig/table/other)*

Key conclusions of study authors	Post-partum females suffering from sacroiliac joint syndrome experienced relief from both manipulation and piriformis trigger point therapy, and this form of therapry should be a treatment consideration by medical doctors(especially gynaecologists)	
References to other relevant studies	References pg 84-86	
Correspondence required for further study information *(from whom, what and when)*	Larger sample sizes required in conjunction with Technetium bone scanning to assess for inflammation	

Notes:

APPENDIX E: DATA EXTRACTION SHEET FOR RCTS AND NON-RCTS

Review title or ID	A Study to Determine the Effectiveness of Chiropractic Manipulative Therapy of the Sacroiliac Joint and Pelvic Stabilisation Exercises in the Management of Post-Partum Lower Back Pain

Study ID *(surname of first author and year first full report of study was published e.g. Smith 2001)*	Rosenberg 2008
Report ID	
Report ID of other reports of this study including errata or retractions	
Notes	

General Information

Date form completed *(dd/mm/yyyy)*	31/07/2023
Name/ID of person extracting data	Dr RH White
Reference citation	
Study author contact details	
Publication type *(e.g. full report, abstract, letter)*	Dissertation
Notes:	

Study eligibility

Study Characteristics	Eligibility criteria *(Insert inclusion criteria for each characteristic as defined in the Protocol)*	Eligibility crit eria met? Yes	No	Unclear	Location in text or source *(pg & ¶/fig/table/other)*
Type of study	Randomised Controlled Trial	X	☐	☐	
	Quasi-randomised Controlled Trial	☐	X		

	Controlled Before and After Study Contemporaneous data collection Comparable control sites At least 2 x intervention and 2 x control clusters	X ☐ ☐	
	Interrupted Time Series At least 3 time points before and 3 after the intervention Clearly defined intervention point	☐ ☐ X	
	Other design (specify):	☐ ☐ ☐	
Participants		X ☐ ☐	
Types of intervention		X ☐ ☐	
Types of comparison		X ☐ ☐	
Types of outcome measures		X ☐ ☐	
INCLUDE X		EXCLUDE ☐	
Reason for exclusion			
Notes:			

Methods

	Descriptions as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*
Aim of study *(e.g. efficacy, equivalence, pragmatic)*	Efficacy of three different Chiropractic treatment protocols in the treatment of post-partum low back pain	
Design *(e.g. parallel, crossover, non-RCT)*	parallel	
Unit of allocation *(by individuals, cluster/ groups or body parts)*	Individuals	
Start date	Undisclosed	
End date	Undisclosed	
Duration of participation *(from recruitment to last follow-up)*	3 weeks	
Ethical approval	X	

needed/ obtained for study	Yes No nclear		
Notes:			

Participants

	Description *Include comparative information for each intervention or comparison group if available*	Location in text or source *(pg & ¶/fig/table/other)*
Population description *(from which study participants are drawn)*	Healthy female patients between eighteen and fifty years of age, and at least three months post-partum	
Setting *(including location and social context)*	Patients were recruited by advertisements and pamphlets in the local medical facilities, posters were placed at the TWR Health Clinic, nursery schools and Morningside Dispensary	
Inclusion criteria	Post-partum lower back pain	
Exclusion criteria	Traumatic lower back pain, neurological complications, visceral pathology, contraindications to chiropractic manipulation	
Method of recruitment of participants *(e.g. phone, mail, clinic patients)*	Advertisements and pamphlets	
Informed consent obtained	X Yes ☐ ☐ clear No	
Total no. randomised *(or total pop. at start of study for NRCTs)*	30	

Clusters *(if applicable, no., type, no. people per cluster)*	10 per group	
Baseline imbalances	Undisclosed	
Withdrawals and exclusions *(if not provided below by outcome)*	Undisclosed	
Age	20-42	
Sex	Female	
Race/Ethnicity	No significant statistical differences	
Severity of illness	Subacute	
Co-morbidities	None	
Other relevant sociodemographics	None	
Subgroups measure	None	
Subgroups reported	None	
Notes:		

Intervention groups

Intervention Group 1

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*

Group name	Group 1: diversified CMT only Group 2: dynamic strenghthening exercises only Group 3: Combination of CMT and strengthening	28
No. randomised to group *(specify whether no. people or clusters)*	10	28

Theoretical basis *(include key references)*		
Description *(include sufficient detail for replication, e.g. content, dose, components)*	Chiropractic adjustment of sacroiliac joints using the diversified method	28
Duration of treatment period	3 weeks	30
Timing *(e.g. frequency, duration of each episode)*	2 treatments per week	30
Delivery *(e.g. mechanism, medium, intensity, fidelity)*	Chiropractic adjustment	
Providers *(e.g. no., profession, training, ethnicity etc. if relevant)*	Chiropractic extern	
Co-interventions	Dynamic Stabilising and strengthening exercises	

Economic information *(i.e. intervention cost, changes in other costs as result of intervention)*	Undisclosed	
Resource requirements *(e.g. staff numbers, cold chain, equipment)*	Minimal	
Integrity of delivery	Good	
Compliance	Good	
Notes:		

Outcomes

	Description as stated in report/paper	Location in text or source *(pg & /fig/table/other)*
Outcome name	CMT only	84

Outcome 1

Time points measured *(specify whether from start or end of intervention)*	Visit 1 vs visit 3 Visit 1 vs visit 6 Visit 3 vs visit 6	88
Time points reported	Visit 1, 3, 6	
Outcome definition *(with diagnostic criteria if relevant)*	Increased flexibility (Schober's test) Subjective pain (Numerical Pain Rating Scale) Pain and disability (Oswestry Lower Back Pain and Disability Questionnaire)	88

Person measuring/ reporting	Author	
Unit of measurement *(if relevant)*	N/A	
Scales: upper and lower limits *(indicate whether high or low score is good)*	Flexibility, high is good Pain, low is good	
Is outcome/tool validated?	X Yes ☐ No ☐ clear	
Imputation of missing data *(e.g. assumptions made for ITT analysis)*	None	
Assumed risk estimate *(e.g. baseline or population risk noted in Background)*	Low	
Power *(e.g. power & sample size calculation, level of power achieved)*	Low, small sample groups	
Notes:		

Other

Study funding sources *(including role of funders)*	Undisclosed	

Possible conflicts of interest *(for study authors)*	None	
Notes:		

Risk of Bias assessment

Domain	Risk of bia s Low High Unclear	Support for judgement *(include direct quotes where available with explanatory comments)*	Location in text or source *(pg & ¶/fig/table/other)*
Random sequence generation *(selection bias)*	X		
Allocation concealment *(selection bias)*	☐ ☐ X		
Blinding of participants and personnel *(performance bias)*	☐ X ☐	Outcome group: All/	
(if separate judgement by outcome(s) required)	☐ ☐ ☐	Outcome group:	
Blinding of outcome assessment *(detection bias)*	☐ X ☐	Outcome group: All/	

(if separate judgement by outcome(s) required)		Outcome group:	
Incomplete outcome data *(attrition bias)*	X	Outcome group: All/	
(if separate judgement by outcome(s) required)		Outcome group:	
Selective outcome reporting? *(reporting bias)*	X		
Other bias			
Notes:			

Data and analysis

Dichotomous outcome

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/ other)*

Comparison	N/A	
Outcome	N/A	
Subgroup	N/A	

Time point *(specify from start or end of intervention)*	N/A				
Results	Intervention		Comparison		
	No. with event	Total in group	No. with event	Total in group	
	N/A				
Any other results reported *(e.g. odds ratio, risk difference, CI or P value)*	N/A				
No. missing participants	N/A				
Reasons missing	N/A				
No. participants moved from other group	N/A				
Reasons moved	N/A				
Unit of analysis *(by individuals, cluster/groups or body parts)*	N/A				

Statistical methods used and appropriateness of these *(e.g. adjustment for correlation)*	N/A		
Reanalysis required?			
(specify, e.g. correlation adjustment)	Yes No Unclear		
Reanalysis possible?	Yes No Unclear		
Reanalysed results			
Notes:			

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*
Comparison	Group 2: dynamic strengthening exercises only	
Outcome		
Subgroup		

Continuous outcome

Time point *(specify from start or end of intervention)*	Visit 1 vs visit 3 Visit 1 vs visit 6 Visit 3 vs visit 6	

Post-intervention or change from baseline?	None						
Results	Intervention			Comparison			
	Mean	SD *(or other variance, specify)*	No. participants	Mean	SD *(or other variance, specify)*	No. participants	
			10			10	
Any other results reported *(e.g. mean difference, CI, P value)*							

No. missing participants	None		
Reasons missing	N/A		
No. participants moved from other group	None		
Reasons moved	N/A		
Unit of analysis *(individuals, cluster/ groups or body parts)*	Individuals		
Statistical methods used and appropriateness of these *(e.g. adjustment for correlation)*	Statistical Programme for Social Studies version 12 Incorporated. The parametric one-way Anova test, the Scheffe Multiple Comparisons test and the Paired-t test was used for the intra-group and inter-group analysis.		
Reanalysis required? *(specify)*	X Ye s No clear U		
Reanalysis possible?	X N clear Yes o		
Reanalysed results			
Notes:			

Other outcome

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*
Comparison	CMT combined with dynamic stabilising exercises	
Outcome		
Subgroup		

Time point *(specify from start or end of intervention)*	Visit 1 vs visit 3 Visit 1 vs visit 6 Visit 3 vs visit 6				
No. participant	Intervention		Control		
Results	Intervention result	SE (or other variance)	Control result	SE (or other variance)	
	Overall results		SE (or other variance)		

Any other results reported			
No. missing participants	None		
Reasons missing			
No. participants moved from other group	None		
Reasons moved			
Unit of analysis *(by individuals, cluster/groups or body parts)*	Individuals		
Statistical methods used and appropriateness of these	Statistical Programme for Social Studies version 12 Incorporated. The parametric one-way Anova test, the Scheffe Multiple Comparisons test and the Paired-t test was used for the intra-group and inter-group analysis.		
Reanalysis required? *(specify)*	X ___ No ___Yes Unclear		
Reanalysis possible?	☐ X s ☐ Ye No Unclear		

Reanalysed results		
Notes:		

Other information

	Description as stated in report/paper	**Location in text or source** *(pg & ¶/fig/table/other)*
Key conclusions of study authors	Chiropractic Manipulative Therapy (CMT) and slow dynamic strengthening exercises are singularly or in combination beneficial to the reduction of pain and ultimately produce an increased in range of motion of forward flexion, on women with post- partum low back pain.	95
References to other relevant studies	References	99-103
Correspondence required for further study information *(from whom, what and when)*	Recommendations pg 96-97	
Notes:		

RevMan ROB Tool- Gausel et al. 2019 1

Entry	Judgement	Support of judgement
Random sequence generation(selection bias)	High	Patients recruited in an outpatient clinic at Stavanger University Hospital, Norway and in a private chiropractic clinic in Stavanger. Those with persistent, dominating 1sided PGP were included in this pilot study
Allocation concealment (selection bias)	Low	The women were randomized using closed envelopes.
Blinding of participants and personnel (performance bias)	High	The limitation to this study is that both groups underwent interventions, and moreover, the same type of intervention: individualized rehabilitation
Blinding of outcome assessment (detection bias)(patient-reported outcomes)	High	Single Blinded study
Blinding of outcome assessment(detection bias)(all-cause mortality)	Low	Assessors aware of allocated interventions
Incomplete outcome data	Low	No missing data

RevMan ROB Tool- Pritchard 2001 1

Entry	Judgement	Support of judgement
Random sequence generation(selection bias)	Low	Systematic randomised sampling
Allocation concealment (selection bias)	Low	Systematic randomised sampling
Blinding of participants and personnel (performance bias)	High	No blinding
Blinding of outcome assessment (detection bias)(patient-reported outcomes)	High	No blinding
Blinding of outcome assessment(detection bias)(all-cause mortality)	High	No blinding
Incomplete outcome data	Low	

RevMan ROB Tool- Rosenberg 2008 1

Entry	Judgement	Support of judgement
Random sequence generation(selection bias)	High	The patients were divided up into three groups of ten patients each.
Allocation concealment (selection bias)	High	Randomisation process undislosed

Blinding of participants and personnel (performance bias)	High	No clear blinding process
Blinding of outcome assessment (detection bias)(patient-reported outcomes)	High	No clear blinding process
Blinding of outcome assessment(detection bias)(all-cause mortality)	High	No patient blinding
Incomplete outcome data	Low	No missing data

APPENDIX E: DATA EXTRACTION SHEET FOR RCTS AND NON-RCTS

Review title or ID	Chronic post-partum osteitis pubis managed with chiropractic.
Study ID *(surname of first author and year first full report of study was published e.g. Smith 2001)*	Fano 2013
Report ID	
Report ID of other reports of this study including errata or retractions	
Notes	

General Information

Date form completed *(dd/mm/yyyy)*	20/07/2023

Name/ID of person extracting data	RH White
Reference citation	Journal of paediatric, maternal, and family health. 2013:15-17
Study author contact details	
Publication type *(e.g. full report, abstract, letter)*	Case report
Notes:	

Study eligibility

Study Characteristics	Eligibility criteria *(Insert inclusion criteria for each characteristic as defined in the Protocol)*	Eligibility crit eria met? Yes No Unclear	Location in text or source *(pg & ¶/fig/table/other)*
Type of study	Randomised Controlled Trial	X	
	Quasi-randomised Controlled Trial	☐ X ☐	
	Controlled Before and After Study Contemporaneous data collection Comparable control sites At least 2 x intervention and 2 x control clusters	☐ ☐ X	
	Interrupted Time Series At least 3 time points before and 3 after the intervention Clearly defined intervention point	☐ ☐ X	
	Other design (specify):		Case report

		X	
Participants		X	
Types of intervention		X	
Types of comparison		X	
Types of outcome measures		X	
INCLUDE X		EXCLUDE	
Reason for exclusion			
Notes:			

Methods

	Descriptions as stated in report/paper	**Location in text or source** *(pg & ¶/fig/table/other)*

Aim of study *(e.g. efficacy, equivalence, pragmatic)*	Efficacy of chiropractic management of chronic post partum osteitis pubis		
Design *(e.g. parallel, crossover, non-RCT)*	Case report		
Unit of allocation *(by individuals, cluster/ groups or body parts)*	Individual		
Start date	None		
End date	None		
Duration of participation *(from recruitment to last follow-up)*	5 months		
Ethical approval needed/ obtained for study	**X** s No Ye nclear		

Notes:

Participants

	Description *Include comparative information for each intervention or comparison group if available*	Location in text or source *(pg & ¶/fig/table/other)*
Population description *(from which study participants are drawn)*	None	
Setting *(including location and social context)*	Private practic	
Inclusion criteria	Osteitis pubis	
Exclusion criteria	None	
Method of recruitment of participants *(e.g. phone, mail, clinic patients)*	Specific condition	

Informed consent obtained	Yes ___ No ___ Unclear X		
Total no. randomised *(or total pop. at start of study for NRCTs)*	N/A		
Clusters *(if applicable, no., type, no. people per cluster)*	N/A		
Baseline imbalances	N/A		
Withdrawals and exclusions *(if not provided below by outcome)*	None		
Age	32		
Sex	Female		
Race/Ethnicity	Undisclosed		
Severity of illness	Chronic		
Co-morbidities	Undisclosed		
Other relevant sociodemographics	Undisclosed		
Subgroups measure	None		
Subgroups reported	None		
Notes:			

Intervention groups

Intervention Group 1

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*
Group name	Undisclosed	
No. randomised to group *(specify whether no. people or clusters)*	Individual	

Theoretical basis *(include key references)*	None	
Description *(include sufficient detail for replication, e.g. content, dose, components)*	Chronic post-partum osteitis pubis	
Duration of treatment period	5 months	
Timing *(e.g. frequency, duration of each episode)*	Undisclosed	
Delivery *(e.g. mechanism, medium, intensity, fidelity)*	Gonstead chiropractic technique and rehabilitation exercises	
Providers *(e.g. no., profession, training, ethnicity etc. if relevant)*	Chiropractor	
Co-interventions	Rehabilitation exercises	

Economic information *(i.e. intervention cost, changes in other costs as result of intervention)*	Undisclosed	
Resource requirements *(e.g. staff numbers, cold chain, equipment)*	Undisclosed	
Integrity of delivery	Good	
Compliance	Good	
Notes:		

Outcomes

Outcome 1

	Description as stated in report/paper	Location in text or source *(pg & /fig/table/other)*
Outcome name	Subjective pain scale	

Time points measured *(specify whether from start or end of intervention)*	None	
Time points reported		
Outcome definition *(with diagnostic criteria if relevant)*	None	

Person measuring/ reporting	Author	
Unit of measurement *(if relevant)*	Subjective pain scale	
Scales: upper and lower limits *(indicate whether high or low score is good)*	Low score good	
Is outcome/tool validated?	X Yes ☐ No ☐ Unclear	
Imputation of missing data *(e.g. assumptions made for ITT analysis)*	N/A	
Assumed risk estimate *(e.g. baseline or population risk noted in Background)*	None	
Power *(e.g. power & sample size calculation, level of power achieved)*	N/A	
Notes:		

Other

Study funding sources *(including role of funders)*	No funding	
Possible conflicts of interest *(for study authors)*	None	
Notes:		

Risk of Bias assessment

Domain	Risk of bias Low High Unclear	Support for judgement *(include direct quotes where available with explanatory comments)*	Location in text or source *(pg & ¶/fig/table/other)*
Random sequence generation *(selection bias)*	☐ X		
Allocation concealment *(selection bias)*	☐ X		
Blinding of participants and personnel *(performance bias)*	☐ ☐ X	Outcome group: All/ Individual	

(if separate judgement by outcome(s) required)		Outcome group:	
Blinding of outcome assessment *(detection bias)*	X	Outcome group: All/	
(if separate judgement by outcome(s) required)		Outcome group:	
Incomplete outcome data *(attrition bias)*	X	Outcome group: All/ Individual	
(if separate judgement by outcome(s) required)		Outcome group:	
Selective outcome reporting? *(reporting bias)*			

Other bias	X		

Notes:

Data and analysis ***Dichotomous outcome***

	Description as stated in report/paper				Location in text or source *(pg & ¶/fig/table/ other)*
Comparison	None				
Outcome					
Subgroup	None				
Time point *(specify from start or end of intervention)*	5 months				
Results	Intervention		Comparison		
	No. with event	Total in group	No. with event	Total in group	
Any other results reported *(e.g. odds ratio, risk difference, CI or P value)*	None				
No. missing participants	None				
Reasons missing	N/A				

No. participants moved from other group	None		
Reasons moved	N/A		
Unit of analysis *(by individuals, cluster/groups or body parts)*	None		
Statistical methods used and appropriateness of these *(e.g. adjustment for correlation)*	None		
Reanalysis required? *(specify, e.g. correlation adjustment)*	X s No Ye	nclear	
Reanalysis possible?	X Unclea Yes No r		
Reanalysed results			
Notes:			

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*
Comparison	None	
Outcome		
Subgroup	None	

Continuous outcome

Time point *(specify from start or end of intervention)*	5 months						
Post-intervention or change from baseline?	None						
Results	Intervention			Comparison			
	Mean	SD *(or other variance, specify)*	No. participants	Mean	SD *(or other variance, specify)*	No. participants	
Any other results reported *(e.g. mean difference, CI, P value)*	None						
No. missing participants	None						

Reasons missing	N/A		
No. participants moved from other group	None		
Reasons moved	N/A		
Unit of analysis *(individuals, cluster/ groups or body parts)*	Individual		
Statistical methods used and appropriateness of these *(e.g. adjustment for correlation)*	Unclear		
Reanalysis required? *(specify)*	X Ye s No clear U		
Reanalysis possible?	X Yes N o clear		
Reanalysed results			
Notes:			

Other outcome

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*
Comparison	None	
Outcome	None	
Subgroup	None	

Time point *(specify from start or end of intervention)*	None				
No. participant	Intervention		Control		
Results	Intervention result	SE (or other variance)	Control result	SE (or other variance)	
	Overall results		SE (or other variance)		
Any other results reported	N/A				

No. missing participants	N/A		
Reasons missing	N/A		
No. participants moved from other group	N/A		
Reasons moved	N/A		
Unit of analysis *(by individuals, cluster/groups or body parts)*	Individual		
Statistical methods used and appropriateness of these	None		
Reanalysis required? *(specify)*	X ___ No ___Yes Unclear		
Reanalysis possible?	X s Ye No Unclear		
Reanalysed results			

Notes:

Other information

	Description as stated in report/paper	**Location in text or source** *(pg & ¶/fig/table/other)*
Key conclusions of study authors	Chiropractic care together with functional rehabilitation enhanced stability of pubic symphysis and resolved pain associated with osteitis pubis	
References to other relevant studies	None	
Correspondence required for further study information *(from whom, what and when)*	None	
Notes:		

APPENDIX E: DATA EXTRACTION SHEET FOR RCTS AND NON-RCTS

Review title or ID	Chiropractic Care for Postpartum Pelvic Girdle Pain and Low Back Pain: A Case Report
Study ID *(surname of first author and year first full report of study was published e.g. Smith 2001)*	Gregory 2011
Report ID	Journal of Clinical Chiropractic Pediatrics Volume 12, No. 2, December 2011
Report ID of other reports of this study including errata or retractions	

Notes

General Information

Date form completed *(dd/mm/yyyy)*	21/07/2023
Name/ID of person extracting data	Dr RH White
Reference citation	
Study author contact details	
Publication type *(e.g. full report, abstract, letter)*	Case report
Notes:	

Study eligibility

Study Characteristics	Eligibility criteria *(Insert inclusion criteria for each characteristic as defined in the Protocol)*	Eligibility cr iteria met? Yes	No	Unclear	Location in text or source *(pg & ¶/fig/table/other)*
Type of study	Randomised Controlled Trial		X		
	Quasi-randomised Controlled Trial		X		
	Controlled Before and After Study		X		
	Contemporaneous data collection Comparable control sites At least 2 x intervention and 2 x control clusters				
	Interrupted Time Series At least 3 time points before and 3 after the intervention Clearly defined intervention point		X		
	Other design (specify):	X			Case report Pg 910-914

Participants		X	
Types of intervention		X	
Types of comparison		X	
Types of outcome measures		X	
INCLUDE X		EXCLUDE	
Reason for exclusion			
Notes:			

Methods

	Descriptions as stated in report/paper	**Location in text or source** *(pg & ¶/fig/table/other)*
Aim of study *(e.g. efficacy, equivalence, pragmatic)*	Efficacy of chiropractic treatment of postpartum pelvic girdle pain and low back pain	

Design *(e.g. parallel, crossover, non-RCT)*	Case report	
Unit of allocation *(by individuals, cluster/ groups or body parts)*	Individual	
Start date	Undisclosed	
End date	Undisclosed	
Duration of participation *(from recruitment to last follow-up)*	4 months	
Ethical approval needed/ obtained for study	☐ Yes ☐ No X unclear	
Notes:		

Participants

	Description *Include comparative information for each intervention or comparison group if available*	Location in text or source *(pg & ¶/fig/table/other)*
Population description *(from which study participants are drawn)*	Post-partum lower back pain	
Setting *(including location and social context)*	Private practice	
Inclusion criteria	Post-partum lower back and pelvis pain	
Exclusion criteria	None	
Method of recruitment of participants *(e.g. phone, mail, clinic patients)*	Clinic patient	
	☐ Yes ☐ No		
Informed consent obtained	X Yes / Unclear / No		
Total no. randomised *(or total pop. at start of study for NRCTs)*	N/A		

Clusters *(if applicable, no., type, no. people per cluster)*	N/A	
Baseline imbalances	N/A	
Withdrawals and exclusions *(if not provided below by outcome)*	None	
Age	33	
Sex	Female	
Race/Ethnicity	Undisclosed	
Severity of illness	Subacute	
Co-morbidities	Undisclosed	
Other relevant sociodemographics	Undisclosed	
Subgroups measure	None	
Subgroups reported	None	
Notes:		

Intervention groups **Intervention**

Group 1

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*
Group name	None	

No. randomised to group *(specify whether no. people or clusters)*	N/A	
Theoretical basis *(include key references)*	N/A	
Description *(include sufficient detail for replication, e.g. content, dose, components)*		
Duration of treatment period	4 weeks	
Timing *(e.g. frequency, duration of each episode)*	5 adjustments	
Delivery *(e.g. mechanism, medium, intensity, fidelity)*	Thompson technique, activator, diversified technique	
Providers *(e.g. no., profession, training, ethnicity etc. if relevant)*	Chiropractor	
Co-interventions	None	
Economic information *(i.e. intervention cost, changes in other costs as result of intervention)*	Undisclosed	
Resource requirements *(e.g. staff numbers, cold chain, equipment)*	None	

Integrity of delivery	Good	
Compliance	Good	
Notes:		

Outcomes

Outcome 1

	Description as stated in report/paper	Location in text or source *(pg & /fig/table/other)*
Outcome name	Pain relief	

Time points measured *(specify whether from start or end of intervention)*	Subjective pain assessment	
Time points reported	Fortnightly over 4 months	

Outcome definition *(with diagnostic criteria if relevant)*	Subjective reporting	
Person measuring/ reporting	Author	
Unit of measurement *(if relevant)*	Subjective assessment	
Scales: upper and lower limits *(indicate whether high or low score is good)*	None	
Is outcome/tool validated?	X ___ ___ Unclea Yes No r	
Imputation of missing data *(e.g. assumptions made for ITT analysis)*	N/A	
Assumed risk estimate *(e.g. baseline or population risk noted in Background)*	N/A	
Power *(e.g. power & sample size calculation, level of power achieved)*	N/A	
Notes:		

Other

Study funding sources *(including role of funders)*	None	
Possible conflicts of interest *(for study authors)*	None	
Notes:		

Risk of Bias assessment

Domain	Risk of bias Low High Unclear	Support for judgement *(include direct quotes where available with explanatory comments)*	Location in text or source *(pg & ¶/fig/table/other)*
Random sequence generation *(selection bias)*	☐ X ☐		
	☐ X		
Allocation concealment *(selection bias)*	☐		

Blinding of participants and personnel *(performance bias)*	☐ ☐ X	Outcome group: All/ Individual	
(if separate judgement by outcome(s) required)	☐ ☐ X	Outcome group:	
Blinding of outcome assessment *(detection bias)*	X ☐	Outcome group: All/	
(if separate judgement by outcome(s) required)	☐ ☐ X	Outcome group:	
Incomplete outcome data *(attrition bias)*	☐ ☐ X	Outcome group: All/	
(if separate judgement by outcome(s) required)	☐ ☐ X	Outcome group:	
	X		

Selective outcome reporting? *(reporting bias)*			
Other bias	X		
Notes:			

Data and analysis

Dichotomous outcome

	Description as stated in report/paper				Location in text or source *(pg & ¶/fig/table/ other)*
Comparison	N/A				
Outcome	N/A				
Subgroup	None				
Time point *(specify from start or end of intervention)*	4 months				
Results	Intervention		Comparison		
	No. with event	Total in group	No. with event	Total in group	
	N/A	N/A			

Any other results reported *(e.g. odds ratio, risk difference, CI or P value)*	None		
No. missing participants	None		
Reasons missing	N/A		
No. participants moved from other group	None		
Reasons moved	N/A		
Unit of analysis *(by individuals, cluster/groups or body parts)*	Subjective assesment		
Statistical methods used and appropriateness of these *(e.g. adjustment for correlation)*	None		
Reanalysis required? *(specify, e.g. correlation adjustment)*	X s Ye No ıclear		
Reanalysis possible?	X Unclear Yes No		
Reanalysed results			

Notes:

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*
Comparison	None	
Outcome	N/A	
Subgroup	None	

Continuous outcome

Time point *(specify from start or end of intervention)*	4 months	
Post-intervention or change from baseline?	None	
Results	Intervention	Comparison

	Mean	SD *(or other variance, specify)*	No. participants	Mean	SD *(or other variance, specify)*	No. participants
			1			0

Any other results reported *(e.g. mean difference, CI, P value)*	None		
No. missing participants	None		
Reasons missing	N/A		
No. participants moved from other group	None		
Reasons moved	N/A		
Unit of analysis *(individuals, cluster/ groups or body parts)*	Individual		
Statistical methods used and appropriateness of these *(e.g. adjustment for correlation)*	None		

Reanalysis required? *(specify)*	s r Ye No X Unclea		
Reanalysis possible?	r Yes No X Unclea		
Reanalysed results			
Notes:			

Other outcome

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*
Comparison	N/A	
Outcome	N/A	
Subgroup	N/A	

Time point *(specify from start or end of intervention)*	4 months				
No. participant	Intervention		Control		
	1		None		
Results	Intervention result	SE (or other variance)	Control result	SE (or other variance)	
	Overall results		SE (or other variance)		
Any other results reported	None				
No. missing participants	None				
Reasons missing	N/A				
No. participants moved from other group	None				
Reasons moved	N/A				
Unit of analysis *(by individuals, cluster/groups or body parts)*	Individual				

Statistical methods used and appropriateness of these	None		
Reanalysis required? *(specify)*	Yes X No nclear		
Reanalysis possible?	Ye s X No ıclear		
Reanalysed results			
Notes:			

Other information

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*
Key conclusions of study authors	There is currently a lack of literature on the effects of chiropractic care on Post-Partum Pelvic pain	Pg 914
References to other relevant studies	Stepleton et al, To and Wong, Ostgaard et al, Albert et al, Bastianseen et al, Noren et al, Wu et al	Pg 911
Correspondence required for further study information *(from whom, what and when)*		

Notes:

APPENDIX E: DATA EXTRACTION SHEET FOR RCTS AND NON-RCTS

Review title or ID	Chiropractic management of postpartum pubic symphysis diastasis: A case report

Study ID *(surname of first author and year first full report of study was published e.g. Smith 2001)*	Henry 2015
Report ID	(JCCA 2015; 59(1):30-36)
Report ID of other reports of this study including errata or retractions	
Notes	

General Information

Date form completed *(dd/mm/yyyy)*	17/07/2023
Name/ID of person extracting data	Dr Rowan White
Reference citation	Henry 2015
Study author contact details	
Publication type *(e.g. full report, abstract, letter)*	Case Report

Notes:

Study eligibility

Study Characteristics	Eligibility criteria *(Insert inclusion criteria for each characteristic as defined in the Protocol)*	Eligibility criteria met? Yes No Unclear	Location in text or source *(pg & ¶/fig/table/other*)

			r)
Type of study	Randomised Controlled Trial		
	Quasi-randomised Controlled Trial		
	Controlled Before and After Study Contemporaneous data collection Comparable control sites		
	At least 2 x intervention and 2 x control clusters		
	Interrupted Time Series At least 3 time points before and 3 after the intervention Clearly defined intervention point		
	Other design (specify):		Case report
Participants			
Types of intervention			

Types of comparison		X	
Types of outcome measures		X	
INCLUDE X		EXCLUDE	
Reason fo exclusion r			
Notes:			

Methods

	Descriptions as stated in report/paper		Location in text or source *(pg & ¶/fig/table/other)*
Aim of study *(e.g. efficacy, equivalence, pragmatic)*	Efficacy of chiropractic treatment in pubic symphysis diastasis		
Design *(e.g. parallel, crossover, non-RCT)*	Case Report		
Unit of allocation *(by individuals, cluster/ groups or body parts)*	individual		
Start date	N/A		
End date	N/A		
Duration of participation *(from recruitment to last follow-up)*	N/A		
Ethical approval needed/ obtained for study	X __ __ __ es No nclear		

Notes:

Participants

	Description *Include comparative information for each intervention or comparison group if available*	Location in text or source *(pg & ¶/fig/table/other)*
Population description *(from which study participants are drawn)*	Post pregnancy pubic pain secondary to symphysis pubis diastasis	
Setting *(including location and social context)*	Private practice	
Inclusion criteria	Post pregnancy pubic pain	
Exclusion criteria	None	
Method of recruitment of participants *(e.g. phone, mail, clinic patients)*	Referral by midwife	
Informed consent obtained	X es No	
Total no. randomised *(or total pop. at start of study for NRCTs)*	N/A	
Clusters *(if applicable, no., type, no. people per cluster)*	N/A	
Baseline imbalances	N/A	

Withdrawals and exclusions *(if not provided below by outcome)*	None	
Age	30 years old	
Sex	Female	
Race/Ethnicity	Not disclosed	
Severity of illness	Acute, severe	
Co-morbidities	None	
Other relevant sociodemographics	None	
Subgroups measure	N/A	
Subgroups reported	N/A	
Notes:		

Intervention groups

Intervention Group 1

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*
Group name	N/A	
No. randomised to group *(specify whether no. people or clusters)*	N/A	

Theoretical basis *(include key references)*	N/A	
Description *(include sufficient detail for replication, e.g. content, dose, components)*	Post pregnancy pubic pain	
Duration of treatment period	14 weeks	
Timing *(e.g. frequency, duration of each episode)*	6 weeks with 9 week follow up	
Delivery *(e.g. mechanism, medium, intensity, fidelity)*	Activator to L4, L5, sacrum and innominate bones bilaterally	
Providers *(e.g. no., profession, training, ethnicity etc. if relevant)*	Chiropractor	
Co-interventions	Sacroiliac belt, stabilising exercises	
Economic information *(i.e. intervention cost, changes in other costs as result of intervention)*	No external funding	
Resource requirements *(e.g. staff numbers, cold chain, equipment)*	N/A	
Integrity of delivery	Good	

Compliance	Good	
Notes:		

Outcomes

Outcome 1

	Description as stated in report/paper	Location in text or source *(pg & /fig/table/other)*
Outcome name	Subjective discomfort	

Time points measured *(specify whether from start or end of intervention)*	None	
Time points reported	6 and 14 weeks	

Outcome definition *(with diagnostic criteria if relevant)*	Visual Analogue Scale, radiographic comparison	
Person measuring/ reporting	Author	
Unit of measurement *(if relevant)*	N/A	
Scales: upper and lower limits *(indicate whether high or low score is good)*	N/A	
Is outcome/tool validated?	X ☐ ☐ ☐ clear es No	
Imputation of missing data *(e.g. assumptions made for ITT analysis)*	None	
Assumed risk estimate *(e.g. baseline or population risk noted in Background)*	N/A	
Power *(e.g. power & sample size calculation, level of power achieved)*	N/A	
Notes:		

Other

Study funding sources *(including role of funders)*	None	
Possible conflicts of interest *(for study authors)*	None	
Notes:		

Risk of Bias assessment

Domain	Risk of bias Low High Unclear	Support for judgement *(include direct quotes where available with explanatory comments)*	Location in text or source *(pg & ¶/fig/table/other)*
Random sequence generation *(selection bias)*	☐ X ☐ ☐	Individual patient with a specific condition	Pg 31
Allocation concealment *(selection bias)*	☐ X ☐ ☐	Specific condition	Pg 31
Blinding of participants and personnel *(performance bias)*	☐ ☐ ☐ X	Outcome group: All/ Single participant	Pg 31

(if separate judgement by outcome(s) required)		Outcome group:	
Blinding of outcome assessment *(detection bias)*	X	Outcome group: All/ No control group, case report	Pg 31
(if separate judgement by outcome(s) required)		Outcome group:	
Incomplete outcome data *(attrition bias)*	X	Outcome group: All/ Single participant	Pg 31
(if separate judgement by outcome(s) required)		Outcome group:	
Selective outcome reporting? *(reporting bias)*	X		
Other bias	X		

Notes:					

Data and analysis ***Dichotomous outcome***

	Description as stated in report/paper				Location in text or source *(pg & ¶/fig/table/ other)*
Comparison	N/A				
Outcome	N/A				
Subgroup	N/A				
Time point *(specify from start or end of intervention)*	6 weeks with 9 week follow up				Pg 34
Results	Intervention		Comparison		
	No. with event	Total in group	No. with event	Total in group	
	N/A	N/A	N/A	N/A	
Any other results reported *(e.g. odds ratio, risk difference, CI or P value)*	None				
No. missing participants	None				
Reasons missing	N/A				

No. participants moved from other group	N/A		
Reasons moved	N/A		
Unit of analysis *(by individuals, cluster/groups or body parts)*	N/A		
Statistical methods used and appropriateness of these *(e.g. adjustment for correlation)*	None		
Reanalysis required? *(specify, e.g. correlation adjustment)*	X s No Ye U clear		
Reanalysis possible?	X nclear No Yes		
Reanalysed results	*N/A*		
Notes:			

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*
Comparison	N/A	
Outcome	N/A	
Subgroup	N/A	

Continuous outcome

Time point *(specify from start or end of intervention)*	N/A						
Post-intervention or change from baseline?	N/A						
Results	Intervention			Comparison			
	Mean	SD *(or other variance, specify)*	No. participants	Mean	SD *(or other variance, specify)*	No. participants	
Any other results reported *(e.g. mean difference, CI, P value)*	N/A						
No. missing participants	N/A						

Reasons missing	N/A		
No. participants moved from other group	N/A		
Reasons moved	N/A		
Unit of analysis *(individuals, cluster/ groups or body parts)*	N/A		
Statistical methods used and appropriateness of these *(e.g. adjustment for correlation)*	N/A		
Reanalysis required? *(specify)*	s X nclear No Ye U		
Reanalysis possible?	X nclear No Yes		
Reanalysed results	N/A		
Notes:			

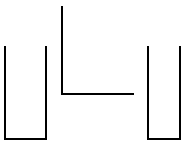
Other outcome

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*
Comparison	N/A	
Outcome	N/A	
Subgroup	N/A	

Time point *(specify from start or end of intervention)*	N/A			
No. participant	Interventio n		Control	
	1		None	
Results	Interventio result n	SE (or other varianc e)	Contr ol result	SE (or other varianc e)
	1		None	
	Overall res ults		SE (or other variance)	

Any other results reported	None

No. missing participants	None	
Reasons missing	N/A	
No. participants moved from other group	N/A	
Reasons moved	N/A	
Unit of analysis *(by individuals, cluster/groups or body parts)*	N/A	
Statistical methods used and appropriateness of these	N/A	
Reanalysis required? *(specify)*	X o N Yes lear nc	

Reanalysis possible?	 s X No Ye nclear
Reanalysed results	
Notes:	

Other information

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*
Key conclusions of study authors	Chiropractic care helped reduce pain, reduce pubic symphysis separation, and facilitate a return to normal activities; however no clear indication as to which intervention was successful in reducing the diastasis.	Pg 35
References to other relevant studies	Limited literature available	
Correspondence required for further study information *(from whom, what and when)*	Collaboration required between midwives and chiropractors, obstetricians	

Notes:

APPENDIX E: DATA EXTRACTION SHEET FOR RCTS AND NON-RCTS

Review title or ID	Improved Health Outcomes in a Woman Experiencing Chronic Post-Partum Low Back Pain

Study ID *(surname of first author and year first full report of study was published e.g. Smith 2001)*	Hoying 2017
Report ID	Journal of Pediatric, Maternal & Family Health July 31, 2017
Report ID of other reports of this study including errata or retractions	
Notes	

General Information

Date form completed *(dd/mm/yyyy)*	24/07/2023
Name/ID of person extracting data	Dr RH White
Reference citation	
Study author contact details	
Publication type *(e.g. full report, abstract, letter)*	Case report
Notes:	

Study eligibility

Study Characteristics	Eligibility criteria *(Insert inclusion criteria for each characteristic as defined in the Protocol)*	Eligibility crit eria met? Yes No Unclear	Location in text or source *(pg & ¶/fig/table/other)*

Type of study	Randomised Controlled Trial	X	
	Quasi-randomised Controlled Trial	X	
	Controlled Before and After Study Contemporaneous data collection Comparable control sites At least 2 x intervention and 2 x control clusters	X	
	Interrupted Time Series At least 3 time points before and 3 after the intervention Clearly defined intervention point	X	
	Other design (specify):	X	Case Report
Participants		X	
Types of intervention		X	
Types of comparison		X	
		X	
Types of outcome measures			

INCLUDE X EXCLUDE	
Reason for exclusion	
Notes:	

Methods

	Descriptions as stated in report/paper	**Location in text or source** *(pg & ¶/fig/table/other)*

Aim of study *(e.g. efficacy, equivalence, pragmatic)*	Efficacy of chiropractic care in post-partum lower back pain	
Design *(e.g. parallel, crossover, non-RCT)*	Case report	
Unit of allocation *(by individuals, cluster/ groups or body parts)*	Individual	
Start date	Undisclosed	
End date	Undisclosed	
Duration of participation *(from recruitment to last follow-up)*	6 weeks	
Ethical approval needed/ obtained for study	☐ Yes ☐ No ☒ clear	

Notes:

Participants

	Description *Include comparative information for each intervention or comparison group if available*	Location in text or source *(pg & ¶/fig/table/other)*
Population description *(from which study participants are drawn)*	Private patient	129
Setting *(including location and social context)*	Private practice	129
Inclusion criteria	Post-partum lower back pain	129
Exclusion criteria	None	
Method of recruitment of participants *(e.g. phone, mail, clinic patients)*	Clinic patient	
Informed consent obtained	Yes: X No: ___ Unclear: ___	
Total no. randomised *(or total pop. at start of study for NRCTs)*	N/A	
Clusters *(if applicable, no., type, no. people per cluster)*	N/A	
Baseline imbalances	N/A	

Withdrawals and exclusions *(if not provided below by outcome)*	None	
Age	33	129
Sex	Female	129
Race/Ethnicity	Undisclosed	
Severity of illness	Chronic	
Co-morbidities	None	
Other relevant sociodemographics	Undisclosed	
Subgroups measure	N/A	
Subgroups reported	N/A	
Notes:		

Intervention groups

Intervention Group 1

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*
Group name	N/A	
No. randomised to group *(specify whether no. people or clusters)*	N/A	

Theoretical basis *(include key references)*	N/A	

Description *(include sufficient detail for replication, e.g. content, dose, components)*	Chiropractic adjustments	129
Duration of treatment period	N/A	
Timing *(e.g. frequency, duration of each episode)*		
Delivery *(e.g. mechanism, medium, intensity, fidelity)*	High velocity low amplitude adjustments assisted with drop table technique	128
Providers *(e.g. no., profession, training, ethnicity etc. if relevant)*	Chiropractor	
Co-interventions	None	
Economic information *(i.e. intervention cost, changes in other costs as result of intervention)*	Undisclosed	
Resource requirements *(e.g. staff numbers, cold chain, equipment)*	None	
Integrity of delivery	Good	
Compliance	Good	

Notes:

Outcomes

Outcome 1

	Description as stated in report/paper	Location in text or source *(pg & /fig/table/other)*
Outcome name	Pain relief and subluxation correction	128

Time points measured *(specify whether from start or end of intervention)*	6 weeks after initial treatm ent	129
Time points reported	None	
Outcome definition *(with diagnostic criteria if relevant)*	None	

Person measuring/ reporting	Author	
Unit of measurement *(if relevant)*	Radiographic assessment Subjective pain rating scale	129
Scales: upper and lower limits *(indicate whether high or low score is good)*	Low is a good score	129
Is outcome/tool validated?	X Yes ☐ Unclear No	
Imputation of missing data *(e.g. assumptions made for ITT analysis)*	N/A	
Assumed risk estimate *(e.g. baseline or population risk noted in Background)*	N/A	
Power *(e.g. power & sample size calculation, level of power achieved)*	N/A	
Notes:		

Other

Study funding sources *(including role of funders)*	None	
Possible conflicts of interest *(for study authors)*	None	
Notes:		

Risk of Bias assessment

Domain	Risk of bias Low High Unclear	Support for judgement *(include direct quotes where available with explanatory comments)*	Location in text or source *(pg & ¶/fig/table/other)*
Random sequence generation *(selection bias)*	☐ X ☐		
Allocation concealment *(selection bias)*	☐ X ☐		
Blinding of participants and personnel *(performance bias)*	☐ X ☐	Outcome group: All/ Individual	

(if separate judgement by outcome(s) required)	☐ ☐ X	Outcome group:	
Blinding of outcome assessment *(detection bias)*	☐ ☐ X	Outcome group: All/	
(if separate judgement by outcome(s) required)	☐ ☐ X	Outcome group:	
Incomplete outcome data *(attrition bias)*	☐ ☐ X	Outcome group: All/	
(if separate judgement by outcome(s) required)	☐ ☐ X	Outcome group:	
Selective outcome reporting? *(reporting bias)*	☐ ☐ X		
Other bias	— — —		

Notes:

Data and analysis

Dichotomous outcome

	Description as stated in report/paper				Location in text or source *(pg & ¶/fig/table/ other)*
Comparison	None				
Outcome	Good				
Subgroup	None				
Time point *(specify from start or end of intervention)*	6 days				
Results	Intervention		Comparison		
	No. with event	Total in group	No. with event	Total in group	
Any other results reported *(e.g. odds ratio, risk difference, CI or P value)*	None				
No. missing participants	None				
Reasons missing	N/A				

No. participants moved from other group	N/A		
Reasons moved	N/A		
Unit of analysis *(by individuals, cluster/groups or body parts)*	Individual		
Statistical methods used and appropriateness of these *(e.g. adjustment for correlation)*	Undisclos ed		
Reanalysis required? *(specify, e.g. correlation adjustment)*	Ye s / No / X Unclear		
Reanalysis possible?	No / Unclear / X Yes		
Reanalysed results	*N/A*		
Notes:			

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*
Comparison	None	
Outcome	Good	
Subgroup	None	

Continuous outcome

Time point *(specify from start or end of intervention)*	6 days					
Post-intervention or change from baseline?	Undisclosed					
Results	Intervention			Comparison		
	Mean	SD *(or other variance, specify)*	No. participants	Mean	SD *(or other variance, specify)*	No. participants
			1			0
Any other results reported *(e.g. mean difference, CI, P value)*	N/A					

No. missing participants	None	
Reasons missing	N/A	
No. participants moved from other group	N/A	
Reasons moved	N/A	
Unit of analysis *(individuals, cluster/ groups or body parts)*	Individual	
Statistical methods used and appropriateness of these *(e.g. adjustment for correlation)*	undisclosed	
Reanalysis required? *(specify)*	X s Unclear Ye No	
Reanalysis possible?	X Unclear Yes No	
Reanalysed results	N/A	

Notes:

Other outcome

	Description as stated in report/paper	Location in text or source *(pg & ¶/fig/table/other)*
Comparison	None	
Outcome	Good	
Subgroup	None	

Time point *(specify from start or end of intervention)*	N/A				
No. participant	Intervention		Control		
Results	Intervention result	SE (or other variance)	Control result	SE (or other variance)	

	Overall results		SE (or other variance)		
Any other results reported	N/A				

No. missing participants	N/A		
Reasons missing	N/A		
No. participants moved from other group	N/A		
Reasons moved	N/A		
Unit of analysis *(by individuals, cluster/groups or body parts)*	N/A		
Statistical methods used and appropriateness of these	N/A		

Reanalysis required? *(specify)*	X No Yes Unclear		
Reanalysis possible?	X s Unclear Ye No		
Reanalysed results	N/ A		
Notes:			

Other information

	Description as stated in report/paper	**Location in text or source** *(pg & ¶/fig/table/other)*
Key conclusions of study authors	Women suffering from post-partum pubic and lower back pain may benefit from chiropractic care.	128
References to other relevant studies	Huerta-Enochian et al, Keller et al, Bernard and Tuchin, Peterson et al, George et al, Haavik et al	130
Correspondence required for further study information *(from whom, what and when)*	Further research recommended	

Notes:

APPENDIX G: REVIEWER'S MEMORANDUM OF AGREEMENT (MOA)

This is an agreement between Tendeka Phakathi (herein known as Main Researcher) and Rasheed Abdul-Ashura (herein know as Reviewer) of the proposed study titled *Chiropractic manipulation and mobilisation for postpartum low back pain: a systematic review.*

I. PURPOSE & SCOPE

The purpose of this MOA is to identify the roles and responsibilities of each party as they relate to *"Chiropractic manipulation and mobilisation for postpartum low back pain: a systematic review"*. The memorandum of agreement serves as a planning document for the project.

II. BACKGROUND

Between 33% and 75% of women experience postpartum low back pain (Ostgaard et al. 1992; Tu & Wong 2008; Corso et al. 2016). This often leads to a debilitating burden of maternal morbidities that decrease a woman's capacity to return to a productive life after delivery (Gregory & Rowel 2011; Peterson et al. 2012; Bergstrom et al. 2016).

The aim of this research is to evaluate and consolidate existing evidence in the literature on the clinical efficacy of chiropractic manipulation and mobilisation for postpartum low back pain. This will be done in the form of a systematic review. The process will entail identifying all clinical trials (randomised and non-randomised) and observational studies e.g. case reports and case series related to chiropractic manipulation and mobilisation of the low back in women with postpartum low-back pain. The researcher will use the Cochrane framework for conducting systematic reviews and the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) tool as the framework for both the collection and reporting of evidence (Moher et al. 2009). Data will be extracted from each included study using a prepared data extraction sheet.

The following critical appraisal tools will be used for assessing the validity and quality of included study types: RoB Man "Risk of Bias" tool (Higgins et al. 2011) will be used for randomised controlled trials; the Newcastle-Ottawa Scale for both non-randomised studies as well as case reports and case series (Margulis et al. 2014). The results will be synthesized and interpreted. Furthermore, the GRADE quality of evidence tool will be used to determine the strength of evidence for main outcomes. A summary of findings will be done and an assessment on the clinical efficacy of manipulation and mobilisation for postpartum low back pain will be made together with recommendations and limitations.

Reviewer 2- Dr Abdul-Ashura Rasheed (AAR)

APPENDIX E: DATA EXTRACTION SHEET FOR RCTS AND NON-RCTS

Adding CBT to individual rehab for persistent pelvic girdle pain post partum

Review title or ID	
Study ID *(surname of first author and year first full report of study was published e.g. Smith 2003)*	Gausel et al 2019
Report ID	
Report ID of other reports of this study including errata or retractions	
Notes	

1 General Information

Date form completed *(dd/mm/yyyy)*	August 2023
Name/ID of person extracting data	Ashwini Prabhu Rathod
Reference citation	https://doi.org/10.1016/j.mpt.2018.2006
Study author contact details	
Publication type *(e.g. full report, abstract, letter)*	Article
Notes:	

2 Study eligibility

Study Characteristics	Eligibility criteria *(insert inclusion criteria for each characteristic as defined in the Protocol)*	Eligibility criteria met? Yes	No	Unclear	Location in text or source *(pg & ¶/fig/table/other)*
Type of study	Randomised Controlled Trial	☑	☐	☐	
	Quasi-randomised Controlled Trial	☐	☐	☐	
	Controlled Before and After Study Contemporaneous data collection Comparable control sites At least 2 x intervention and 2 x control clusters	☐	☐	☐	
	Interrupted Time Series At least 3 time points before and 3 after the intervention Clearly defined intervention point	☐	☐	☐	
	Other design (specify):	☐	☐	☐	
Participants		☑	☐	☐	
Types of intervention		☑	☐	☐	
Types of comparison		☑	☐	☐	
Types of outcome measures		☑	☐	☐	
INCLUDE ☑		EXCLUDE ☐			
Reason for exclusion					

APPENDIX E: DATA EXTRACTION SHEET FOR RCTS AND NON-RCTS

Review title or ID	Pritchard A Comparison of SIJ manipulation vs. Piriformis mm/ice and Stretch combined in SIJ on Post Partum females suffering SI- syndrome
Study ID *(surname of first author and year first full report of study was published e.g. Smith 2001)*	
Report ID	
Report ID of other reports of this study including errata or retractions	
Notes	

1 General Information

Date form completed *(dd/mm/yyyy)*	August 2013
Name/ID of person extracting data	Rishma Fadul-Rasheed
Reference citation	None - Dissertation
Study author contact details	
Publication type *(e.g. full report, abstract, letter)*	None- Dissertation
Notes:	

2 Study eligibility

Study Characteristics	Eligibility criteria *(insert inclusion criteria for each characteristic as defined in the Protocol)*	Eligibility criteria met? Yes	No	Unclear	Location in text or source *(pg & ¶/fig/table/other)*
Type of study	Randomised Controlled Trial	☑	☐	☐	
	Quasi-randomised Controlled Trial	☐	☐	☐	
	Controlled Before and After Study Contemporaneous data collection Comparable control sites At least 2 x intervention and 2 x control clusters	☐	☐	☐	
	Interrupted Time Series At least 3 time points before and 3 after the intervention Clearly defined intervention point	☐	☐	☐	
	Other design (specify):	☐	☐	☐	
Participants		☑	☐	☐	
Types of intervention		☑	☐	☐	
Types of comparison		☑	☐	☐	
Types of outcome measures		☑	☐	☐	
INCLUDE ☑		EXCLUDE ☐			
Reason for exclusion					

APPENDIX E: DATA EXTRACTION SHEET FOR RCTS AND NON-RCTS

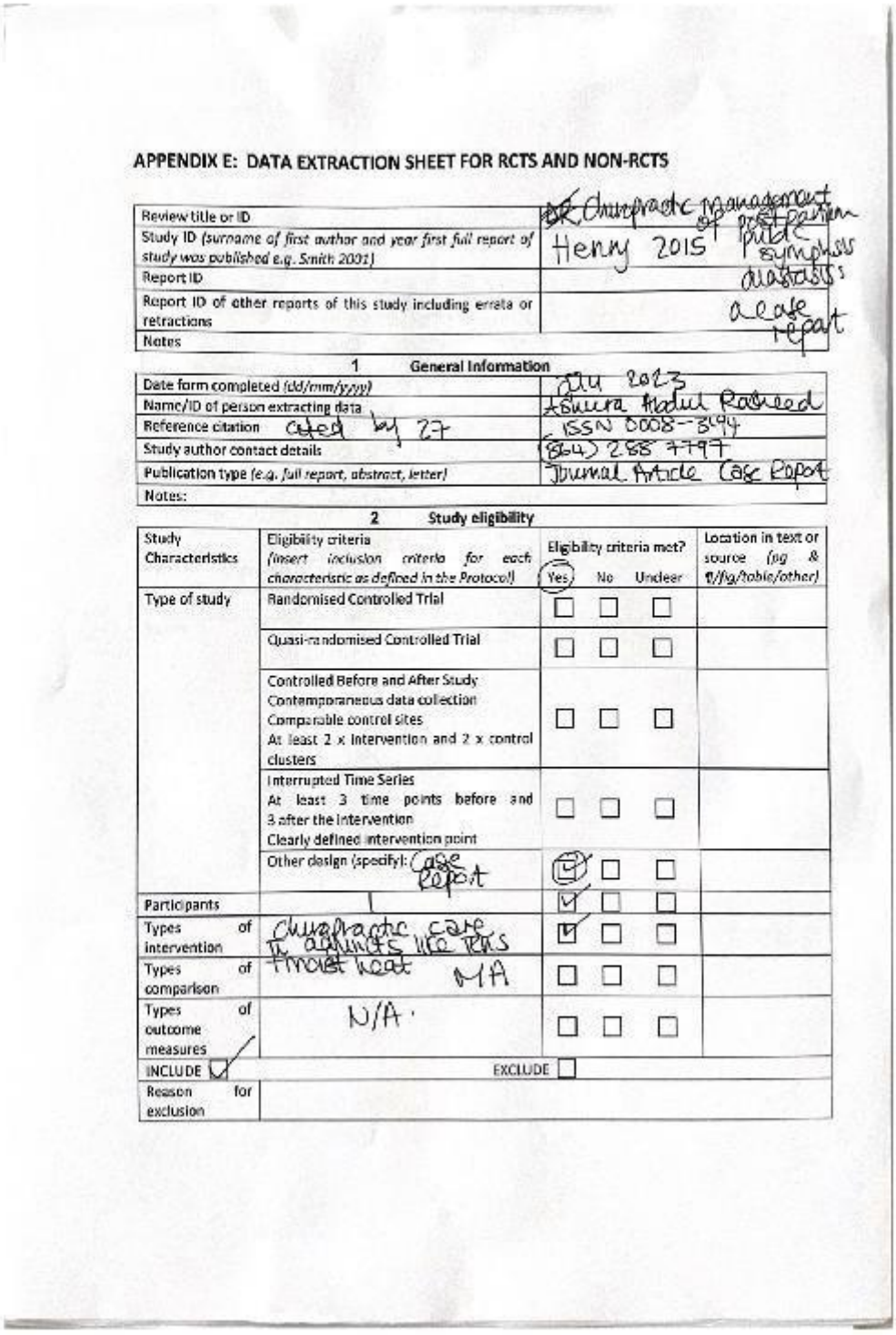
Review title or ID	Chronic Post Partum Obesity Risks Managed in Chiropractic
Study ID *(Surname of first author and year first full report of study was published e.g. Smith 2001)*	Fano 2013
Report ID	
Report ID of other reports of this study including errata or retractions	
Notes	

1 General Information

Date form completed *(dd/mm/yyyy)*	July 2023
Name/ID of person extracting data	Ashwini Prabhu Rathod
Reference citation	
Study author contact details	Private Practice ~~details not provided~~
Publication type *(e.g. full report, abstract, letter)*	Case Report
Notes:	

2 Study eligibility

Study Characteristics	Eligibility criteria *(insert inclusion criteria for each characteristic as defined in the Protocol)*	Eligibility criteria met? Yes	No	Unclear	Location in text or source *(pg & ¶/fig/table/other)*
Type of study	Randomised Controlled Trial	☐	☐	☐	
	Quasi-randomised Controlled Trial	☐	☐	☐	
	Controlled Before and After Study Contemporaneous data collection Comparable control sites At least 2 x intervention and 2 x control clusters	☐	☐	☐	
	Interrupted Time Series At least 3 time points before and 3 after the intervention Clearly defined intervention point	☐	☐	☐	
	Other design (specify): Case Report	☑	☐	☐	
Participants		☑	☐	☐	
Types of intervention		☑	☐	☐	
Types of comparison	N/A	☐	☐	☐	
Types of outcome measures	N/A	☐	☐	☐	
INCLUDE ☑		EXCLUDE ☐			
Reason for exclusion	Case report, no [illegible] comparison [illegible] Rathod.				



APPENDIX E: DATA EXTRACTION SHEET FOR RCTS AND NON-RCTS

Review title or ID	SR Chiropractic management of postpartum
Study ID *(surname of first author and year first full report of study was published e.g. Smith 2001)*	Henry 2015 pilot synthesis analysis
Report ID	
Report ID of other reports of this study including errata or retractions	a case report
Notes	

1 General Information

Date form completed *(dd/mm/yyyy)*	July 2023
Name/ID of person extracting data	Laura Abdul Rasheed
Reference citation cited by 27	ISSN 0008-3194
Study author contact details	(864) 288 7797
Publication type *(e.g. full report, abstract, letter)*	Journal Article Case Report
Notes:	

2 Study eligibility

Study Characteristics	Eligibility criteria *(insert inclusion criteria for each characteristic as defined in the Protocol)*	Eligibility criteria met? Yes	No	Unclear	Location in text or source *(pg & ¶/fig/table/other)*
Type of study	Randomised Controlled Trial	☐	☐	☐	
	Quasi-randomised Controlled Trial	☐	☐	☐	
	Controlled Before and After Study Contemporaneous data collection Comparable control sites At least 2 x intervention and 2 x control clusters	☐	☐	☐	
	Interrupted Time Series At least 3 time points before and 3 after the intervention Clearly defined intervention point	☐	☐	☐	
	Other design (specify): Case Report	☑	☐	☐	
Participants		☑	☐	☐	
Types of intervention	Chiropractic care Includes use PRS	☑	☐	☐	
Types of comparison	Thrust heat MA	☐	☐	☐	
Types of outcome measures	N/A.	☐	☐	☐	
INCLUDE ☑	EXCLUDE ☐				
Reason for exclusion					

Appendix F (All articles included)

4 RCTs

Adding Chiropractic Treatment to Individual Rehabilitation for Persistent Pelvic Girdle Pain 3 to 6 Months After Delivery: A Pilot Randomized Trial

Anne M. Gausel, Cand.manu,[a] Ingvild Dalen, PhD,[b] Inger Kjærmann, MSc,[c] Stefan Malmqvist, MSc,[d] Knut Andersen, PhD,[c] Jan Petter Larsen, PhD,[e] and Inger Økland, PhD[a]

ABSTRACT

Objective: The purpose of this study was to investigate the feasibility of conducting a study examining the influence of individualized rehabilitation and chiropractic treatment, compared with individualized rehabilitation alone, in women with persistent dominating 1-sided pelvic girdle pain (PGP) 3 to 6 months after delivery.

Methods: Women were recruited from an outpatient clinic at Stavanger University Hospital, Norway and in a private chiropractic clinic in Stavanger. Those with persistent, dominating 1-sided PGP were included in this pilot study. Those who met inclusion criteria were randomized into 2 groups, one group received individualized rehabilitation and chiropractic treatment and the other group women received individualized rehabilitation alone. Treatment was measured for 20 weeks.

Results: Of 330 consenting women who were recruited who reported pelvic pain during pregnancy, 68 reported PGP or low back pain, and 63 consented to fill in a questionnaire. Forty-seven women underwent a clinical examination 3 to 6 months after delivery. During the examination, the women were diagnosed into subgroups for PGP. After exclusion of the women with low back pain only, a total of 13 women were diagnosed with dominating 1-sided PGP and thus included in this study. Six were randomized to the individualized rehabilitation and chiropractic treatment group and 5 to the individualized rehabilitation alone group. After 20 weeks of intervention, both groups reported improvement in disability and pain, but not in general health status. No serious or long-lasting adverse events were registered after treatment or training.

Conclusion: We found that a study of this nature is feasible. However, the conditions of patient recruitment need to be considered carefully. We learned that a trial to investigate the effect of chiropractic treatment for PGP pain should include all subgroups of PGP to reach an acceptable sample size. (J Manipulative Physiol Ther 2019;42:601-607)

Key Indexing Terms: *Pelvic Girdle Pain; Chiropractic; Exercise Therapy; Postpartum Period*

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(e-mail: *amgausel@hotmail.com*).

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0161-4754

https://doi.org/10.1016/j.jmpt.2018.12.006

INTRODUCTION

Pelvic pain (PP) is a common complaint during pregnancy, and the women experience moderate to severe pain affecting their daily life activities and their possibility of working.[1-4] Most often, the pain resolves and the women recover completely within 3 to 6 months after delivery.[5-7] However, it has been shown that 6% to 8% of women experiencing pelvic girdle pain (PGP) confirmed by clinical examination during pregnancy have not yet recovered 2 to 3 years later.[5,8] The women, who still have PGP 12 weeks after delivery, are suggested to be in transition to a more chronic PGP status.[7]

The etiology of PGP is multifactorial, and there is no obvious explanation for the onset of most cases of PGP. Some risk factors have been discussed, but recent studies are conflicting, and, obviously, several risk factors are at play.[1]

RCT- Gausel et al. 2019 F1 1

A COMPARISON OF SACROILIAC JOINT MANIPULATION VERSUS PIRIFORMIS MUSCLE ICE-AND-STRETCH COMBINED WITH SACROILIAC JOINT MANIPULATION ON POST-PARTUM FEMALES SUFFERING FROM SACROILIAC SYNDROME

A research study submitted to the
Faculty of Health Sciences, Technikon Witwatersrand, Johannesburg
in fulfilment of the requirements for the degree of Master of Technology: Chiropractic
by

Michael Pritchard
(Student Number: 9308439)

Supervisor: _____
Dr. N.S. McLean M. Tech: Chiropractic, I.C.S.S.D.

Co-supervisor: _____
Dr. E.K. Urli M. Dip.C. S.A.

Johannesburg, 2001

RCT- Pritchard 2001 F 2 1

A Study to Determine the Effectiveness of Chiropractic Manipulative Therapy of the Sacroiliac Joint and Pelvic Stabilisation Exercises in the Management of Post-Partum Lower Back Pain

A dissertation submitted in partial fulfilment of the requirements for the Master's Degree in Technology: Chiropractic
University of Johannesburg

By

Marié Jane Rosenberg
(Student number: 809794882)

Supervisor: Dr C.D. Losco [M.Tech Chiro, S.A.]

Co-Supervisor: Dr B. Losco [M.Tech Chiro, S.A.]

RCT- Rosenberg 2008 F3 1

THE RELATIVE EFFECTIVENESS OF SPINAL MANIPULATION IN CONJUNCTION WITH CORE STABILITY EXERCISES AS OPPOSED TO SPINAL MANIPULATION ALONE IN THE TREATMENT OF POST-NATAL MECHANICAL LOW BACK PAIN

By

Dean Paul Charles Wilson

Dissertation submitted in partial compliance with the requirements for the Master's Degree in Technology: Chiropractic at the Durban Institute of Technology.

I, Dean Wilson, do declare that this dissertation is representative of my own work in both conception and execution.

Dean Wilson Date:

APPROVED FOR FINAL SUBMISSION:

Supervisor: Date:

Dr. C. Myburgh

DPhil: SSM, M. Tech: Chiro (CCSP, CCFC)

RCT- Wilson 2006 F4 1

4 Case reports

CR- Fano & Mullin 2013 F5 1

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CR- Gregory & Rowell 2011, pg 910-914 F6 1

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Chiropractic management of postpartum pubic symphysis diastasis: A case report

Lucian Henry, BSc, DC*

This case report describes the chiropractic management of a 30-year-old female patient with severe postpartum pelvic pain secondary to pubic symphysis diastasis. No literature was found on the chiropractic management of postpartum symphysis pubis diastasis. The existing literature concerning chiropractic care for symphysis pubis dysfunction during pregnancy is limited and indicates a potential benefit. Separation of the pubic symphysis may include ligamentous injury to the sacroiliac joints and may lead to chronic pain. Pubic symphysis separation of 17 millimeters was present on digital radiograph. Management consisted of chiropractic adjustments, trigger point release, electrical stimulation, moist heat, sacroiliac belt, and specific stabilizing exercises. The patient's pain improved immediately following treatment on the initial visit. Pain was reduced from 8/10 VAS at the first visit to 2/10 at the fourth visit. She was able to resume normal activities and reached a final pain level of 1/10. The diastasis was reduced by 7 millimeters at 14-weeks post radiograph for a final separation of just under 10 millimeters.

Cette étude de cas décrit le traitement chiropratique d'une patiente de 30 ans souffrant de douleurs pelviennes post-partum secondaires à une symphyse pubienne avec diastasis. Aucun ouvrage n'a été trouvé sur le traitement chiropratique d'une symphyse pubienne post-partum avec diastasis. Les ouvrages au sujet des soins chiropratiques d'un dysfonctionnement symphyse pubienne durant la grossesse sont rares et indiquent un bienfait potentiel. La séparation de la symphyse pubienne peut entraîner une lésion ligamenteuse à l'articulation sacro-iliaque et causer des douleurs chroniques. Une radiographie numérique montre une séparation de la symphyse pubienne de 17 mm. Le traitement consistait à des ajustements chiropratiques, à un relâchement de points gâchettes, à de la stimulation électrique, à une chaleur humide, à une ceinture sacro-iliaque et à des exercices adaptés de stabilisation. La douleur de la patiente a diminué immédiatement après le traitement de la première rencontre. La douleur est passée de 8/10 à l'EVA à la première rencontre à 2/10 à la quatrième rencontre. La patiente a réussi à reprendre ses activités habituelles et son niveau de douleur a diminué à 1/10. Le diastasis a diminué de 7 mm 14 semaines après la radiographie pour une séparation définitive inférieure à 10 mm. On recommande une

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Email: info@henryclinic.com
There are no disclaimers.
The author has obtained the patient's written consent to publish the case.
There was no external funding or support.

CR- Henry 2015 F7 1

CASE STUDY

Improved Health Outcomes in a Woman Experiencing Chronic Post-Partum Low Back Pain

Marie Hoying, DC[1] & Joel Alcantara, DC[2]

Abstract

Objective: To describe the outcomes related to chiropractic in a woman with post-partum back pain.

Clinical Features: A 33-year-old female presented for chiropractic consultation and care with chronic low back pain that began in pregnancy approximately three years prior. History revealed that she had a C-section due to a small pelvic opening. An A-P lumbosacral radiograph demonstrated significant left sacral displacement relative to the median plane.

Intervention and Outcomes: Following the Pierce Results System, the patient was cared for with high velocity low amplitude thrust adjustments assisted with drop table technique. Chiropractic care was administered to the patient over two visits. After one sacral adjustment, comparative radiographic assessment revealed a 72% correction of the sacral subluxation and she had complete relief of symptoms.

Conclusions: This case report provides supporting evidence that women suffering from pelvic and low back pain post-partum may benefit from chiropractic care. Research on the relationship between pelvic subluxation should be further conducted.

Key Words: *Pregnancy, Chiropractic, Subluxation, Adjustment, Pierce Results System, Low back pain*

Introduction

The prevalence of pregnancy-related low back pain ranges from 4 to 76.4 % depending on definition used.[1] Unfortunately, the condition is not self-limiting to pregnancy and in addition with consequences of childbirth (i.e., perineal tears and damage to the striated muscles and nerve supply of the pelvic floor)[2], women continue to suffer in the postpartum period. It's estimated that approximately 80% of women will report mild complaints of low back pain and pelvic pain in the postpartum period, 13% will report moderate pain and 7% will report very serious complaints.[3] In a follow-up study of 632 women that have delivered, the majority of women reported 'recurrent' or 'continuous' pain at 12 months postpartum had not sought any healthcare services during the past 6 months (N = 91, 64.1 %). However, 59.3 % (N = 16) women with 'continuous' pain did report that they had sought healthcare services the past 6 months compared to 30.4 % (N = 35) of women with 'recurrent' pain at 12 months postpartum. The most sought healthcare service was physical therapy/medical care along with acupuncture and chiropractic.[4]

A study found that pelvic girdle pain may influence women's lives for months and years after delivery.[5] Health care

1. Private Practice of Chiropractic, Dublin, OH
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CR- Hoying & Alcantara 2017 F8 1