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Clinical Study

Clinician proficiency in delivering manual treatment for neck pain within specified force ranges

Maruti Ram Gudavalli, PhD[a,*], Robert D. Vining, DC[a], Stacie A. Salsbury, PhD, RN[a], Lance G. Corber, MS[a], Cynthia R. Long, PhD[a], Avinash G. Patwardhan, PhD[b], Christine M. Goertz, DC, PhD[a]

[a]*Palmer Center for Chiropractic Research, Palmer College of Chiropractic, 741 Brady Street, Davenport, IA 52803, USA*
[b]*Department of Orthopaedic Surgery & Rehab, Loyola University Stritch School of Medicine, 2160 S. First Avenue, Maywood, IL 06153, USA*

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Abstract

BACKGROUND CONTEXT: Neck pain is a common musculoskeletal complaint responsive to manual therapies. Doctors of chiropractic commonly use manual cervical distraction, a mobilization procedure, to treat neck pain patients. However, it is unknown if clinicians can consistently apply standardized cervical traction forces, a critical step toward identifying an optimal therapeutic dose.
PURPOSE: To assess clinicians' proficiency in delivering manually applied traction forces within specified ranges to neck pain patients.
STUDY DESIGN: An observational study nested within a randomized clinical trial.
SAMPLE: Two research clinicians provided study interventions to 48 participants with neck pain.
OUTCOME MEASURES: Clinician proficiency in delivering cervical traction forces within three specified ranges (low force, less than 20 N; medium force, 21–50 N; and high force 51–100 N).
METHODS: Participants were randomly allocated to three force-based treatment groups. Participants received five manual cervical distraction treatments over 2 weeks while lying prone on a treatment table instrumented with force sensors. Two clinicians delivered manual traction forces according to treatment groups. Clinicians treated participants first without real-time visual feedback

FDA device/drug status: Not applicable.

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None of the authors have any conflict of interest relative to this study.

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* Corresponding author. Palmer Center for Chiropractic Research, 741 Brady St, Davenport, IA 52803, USA. Tel.: (563) 884-5260; fax: (563) 884-5227.

E-mail address: Gudavalli_r@palmer.edu (M.R. Gudavalli)

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displaying traction force and then with visual feedback. Peak traction force data were extracted and descriptively analyzed.

RESULTS: Clinicians delivered manual cervical distraction treatments within the prescribed traction force ranges 75% of the time without visual feedback and 97% of the time with visual feedback.

CONCLUSIONS: This study demonstrates that doctors of chiropractic can successfully deliver prescribed traction forces while treating neck pain patients, enabling the capability to conduct force-based dose response clinical studies.

Keywords: Biomechanics; Dose; Traction forces; Clinician training; Mobilization; Chiropractic; Manual therapy; Neck pain

Introduction

Musculoskeletal conditions are common causes of pain and disability [1,2], with neck pain representing a prevalent musculoskeletal complaint and costly societal burden [3–9]. Doctors of chiropractic treat neck pain as the second most common condition seen after low back pain [10]. Manual therapists deliver several types of spinal manipulation and mobilization therapies for the treatment of spine related pain [11,12]. Spinal manipulative therapy includes manually delivered high velocity low amplitude procedures, whereas mobilization therapies involve low velocity movements including distraction procedures [10]. The *Bone and Joint Decade Task Force on Neck Pain* and recent systematic reviews noted that noninvasive manual therapy procedures involving mobilization are effective for the management of neck pain [13,14]. One such mobilization procedure is manual cervical distraction or flexion-distraction [15]. Although several published case reports and series show the utility of manual cervical distraction for patients with neck pain [16–19], no randomized clinical studies have demonstrated the effectiveness of this type of spinal mobilization for people with neck pain.

One issue in conducting clinical trials of manual therapies is the standardization of intervention delivery, such as treatment dose [14]. A recent study suggests that the biomechanical forces applied by clinicians during mobilization treatments may have a dose-response effect on clinical outcomes, such as pain or stiffness [20]. However, a systematic review reported that interclinician reliability of forces applied during spinal mobilization procedures was poor-to-moderate, whereas intraclinician reliability was good [21]. Because force application varies for these procedures, there is a need for innovative methods to train and validate the forces clinicians apply during mobilization treatments.

Although manual therapies are used to treat a wide variety of musculoskeletal conditions, few clinical trials have quantified the forces delivered to the patients. Little is known regarding the question of force as a dose for manual therapy procedures including spinal mobilization procedures for neck pain patients. A recent force-based dose randomized controlled trial reported that higher posterior-to-anterior mobilization forces resulted in better clinical outcomes for neck pain patients, suggesting that force as a dose plays an important role and underscores the importance of conducting force dose-response studies for manual therapies [20]. However, to design such studies, technologies and training methods must be developed to reliably quantify forces and certify proficiency in delivering the prescribed forces.

In this study, we evaluated clinicians in their proficiency to deliver manual distraction procedures for prescribed force ranges on neck pain patients undergoing manual cervical distraction in a force-based dose response randomized clinical trial. We developed and used bioengineering technology that provides force-related audio and graphical feedback to train and certify clinicians to deliver manual cervical distraction within prescribed force ranges and measured their ability to perform force prescribed treatment first without any feedback and then with real-time visual force feedback [22].

Methods

This project was part of a larger developmental/translational center grant designed to study chiropractic interventions for cervical spine disorders. We conducted a prospective, observational study nested within a pilot randomized clinical trial of chiropractic clinicians' proficiency in delivering three traction force range doses of manual cervical distraction. The results of the clinical trial will be reported elsewhere. The institutional review board affiliated with the authors' institution approved this study. The neck pain patients who participated in the trial provided written informed consent.

Participants

Two doctors of chiropractic delivered all study treatments. The clinicians (one man and one woman) had extensive clinical experience (31 years and 28 years, respectively) in chiropractic private practice, research, and technique instruction. One clinician had over 5 years of experience in treating patients with the manual cervical distraction technique, whereas the other clinician had not used the technique in clinical settings before this study. The research clinicians underwent 7 weeks of training in