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Changes in female veterans' neck pain following chiropractic care at a hospital for veterans

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ABSTRACT

Objective: To determine if U.S. female veterans had demonstrable improvements in neck pain after chiropractic management at a Veterans Affairs (VA) hospital.
Methods: This was a retrospective cross-sectional study of medical records from female veterans attending a VA chiropractic clinic for neck pain from 2009 to 2015. Paired *t*-tests were used to compare baseline and discharge numeric rating scale (NRS) and Neck Bournemouth Questionnaire (NBQ) scores with a minimum clinically important difference (MCID) set at a 30% change from baseline.
Results: Thirty-four veterans met the inclusion criteria and received a mean of 8.8 chiropractic treatments. For NRS, the mean score improvement was 2.7 (95%CI, 1.9–3.5, p < .001). For the NBQ, the mean score improvement was 13.7 (95%CI, 9.9–17.5, p < .001). For the MCID, the average percent improvement was 45% for the NRS and 38% for the NBQ.
Conclusion: Female veterans with neck pain experienced a statistically and clinically significant reduction in NRS and NBQ scores.

1. Introduction

Neck pain is a common complaint among U.S. military active duty personnel and veterans [1–5]. The causes of neck pain are many, and for those involved with the military they can range from military office work [1] to significant combat trauma [2]. In the veteran population, painful musculoskeletal diagnoses are widespread [6]. Musculoskeletal conditions are the leading cause of morbidity for female veterans [7] and among all veterans with musculoskeletal pain, women are more likely to experience neck pain than men [3].

Today, more women are entering the military than ever before. Women currently comprise 14% of those enlisted within the Department of Defense services [8]. Post-military separation, 32% of women enroll in Veterans Health Administration (VHA) services, a historic high for this population [8]. Determining safe and effective pain management strategies for women with musculoskeletal pain is particularly important as there are indications that over prescription of opioid medications may have a greater negative effect on women than men [9]. The Centers for Disease Control and Prevention (CDC) describe prescription painkiller overdoses as an "under-recognized" and increasing problem for women [9]. There has been a 400% increase in overdose deaths since 1999 for women (compared to a 265% increase for men) and currently 1 in 10 suicides by women in the United States involves prescription painkillers, which the CDC defines as opioids or narcotics [9]. This trend

holds true in the veteran population, where substance use disorders, including opioid misuse, are more strongly associated with suicide for women than for men [10].

One potential non-pharmacological treatment option for musculoskeletal pain is chiropractic care. VHA patients are referred to chiropractic services for a variety of musculoskeletal complaints and neck conditions comprise 24.3% of all referrals, the second leading reason for referral after low back conditions [11]. While 15.8% of VHA chiropractic patients are currently female [11], little is known specifically about female veterans' outcomes with chiropractic management [12]. To our knowledge, no study has examined female veterans' outcomes with chiropractic care for neck pain. The objective of this paper was to determine if female veterans had demonstrable improvements in neck pain after chiropractic management within a Veterans Affairs (VA) hospital. Our hypothesis was that female veterans would have statistically significant and clinically meaningful improvements in neck pain following care.

2. Methods

2.1. Study design

This study was a cross-sectional retrospective medical records review. This protocol was reviewed and approved before commencing the study through the VA Western New York Healthcare System (VAWNYHS) Research and Development Committee and Institutional Review Board.

2.2. Setting

The chiropractic clinic at VAWNYHS served as the setting for this study.

2.3. Participants and variables

All female veterans who were 18–89 years of age at intake and were consulted to chiropractic services during the period January 1, 2009 through December 31, 2015 for a chief complaint of neck pain were eligible for analysis. Patients were excluded if they had received less than 2 chiropractic treatments, if they had a baseline numerical rating scale (NRS) of less than 2 out of 10 or a baseline Neck Bournemouth Questionnaire (NBQ) of less than 14 out of 70 in order to prevent floor effects, or if there were missing data for either the NRS or NBQ. Descriptive variables collected at the date of consultation included race, age, body composition as measured by body mass index (BMI), and service-connected (SC) disability percentage. SC disabilities are injuries or illnesses that are incurred or aggravated during active military service, for which veterans who separated or were discharged from the military under honorable circumstances may be eligible for compensation [13].

The NRS is an 11-point assessment for pain severity with 0 representing no pain and 10 representing "worst pain imaginable" [14]. The NBQ is a multidimensional outcome measure based upon the biopsychosocial model of pain [15–17]. The NBQ is a validated 7-question instrument with scores ranging from 0 to 70 with higher scores representing increased symptom severity [15–17]. NRS and NBQ scores were collected at initial consultation with NRS collected at each follow-up visit and NBQ collected again at the time of re-evaluation. For the purposes of this study, both the number of chiropractic treatments and final outcome measures were collected on either the date of formal discharge by the chiropractic physician or from the last follow-up visit to the chiropractic clinic that was within two months from the previous chiropractic appointment in the event that the patient self-discontinued care.

2.4. Data sources

Data were extracted from medical records into a Microsoft Excel spreadsheet (Microsoft Corp, Redmond, WA) by one of two investigators and added to a prospectively maintained quality assurance data set. A third investigator verified the accuracy of the quality assurance data set by comparison to the medical records for all female veterans meeting inclusion criteria. Any discrepancies found were corrected using data from the medical records.

2.5. Chiropractic treatment methods and frequency

This was a pragmatic design and the type of manual therapy chosen was at the discretion of the provider, considering the presentation of the individual patient, patient preference, and the clinical judgement of the provider. The type of manual therapy varied among patients and among visits, but typically included spinal manipulative therapy (SMT), spinal mobilization, flexion-distraction therapy, and/or myofascial release. SMT was operatively defined as a manipulative procedure involving the application of a high-velocity, low-amplitude thrust to the cervical spine [18]. Spinal mobilization was defined as a form of manually assisted passive motion involving repetitive joint oscillations typically at the end of joint play and without the application of a high-velocity, low-amplitude thrust [18]. Flexion-distraction therapy is a gentle form of unloaded spinal manipulation involving traction components along with manual pressure applied to the neck in a prone position [18]. Myofascial release was defined as manual pressure applied to various muscles either in a static state or while undergoing passive lengthening. Patients also received education about improving posture and stretching recommendations appropriate to their condition.

A typical course of care involved one treatment every one to two weeks with re-evaluation and review of updated outcome measures every fourth treatment or earlier if indicated. Care was delivered by one of two staff chiropractors with some contributions by supervised final-year chiropractic students. The number of treatments provided was calculated by frequency counts.

2.6. Statistical analyses

Descriptive statistics pertaining to race, age, BMI, SC disability percentages and number of treatments were calculated for the sample. BMI categories were designated using those of the CDC: underweight (<18.5 kg/m^2), normal (18.5–24.9 kg/m^2), overweight (25.0–29.9 kg/m^2), obese (≥30.0 kg/m^2) [19].

Sample size for paired t-tests was determined using power analysis in G* Power 3.1.9.2 for Windows (Universität Düsseldorf, Germany) [20] assuming an alpha of 0.05, a power of 0.80, and a medium effect size ($\rho = 0.5$) for a 1-tailed test. The required sample size was determined to be 27. NRS and NBQ data were assessed using the Shapiro Wilk test and met the assumption of normality necessary to run paired t-tests.

Paired t-tests were used to compare baseline and discharge scores for NRS and NBQ with alpha <.05 and a Bonferroni correction of 2 to account for the multiple comparisons between means. Effect sizes were calculated using Cohen's d.

In addition to statistical significance, clinical significance was assessed using a minimum clinically important difference (MCID) of an average 30% or greater change from baseline to discharge for both the NRS and NBQ. MCID was based upon published accounts of an international consensus for a range of commonly used back pain outcome measures [21]. The percentage of patients who reached or exceeded the MCID for the measures used are reported.

All data, except for the sample size estimate, were analyzed using SPSS Statistics for Windows, version 22 (IBM Inc, Armonk, New York).