A randomized clinical trial comparing non-thrust manipulation with segmental and distal dry needling on pain, disability, and rate of recovery for patients with non-specific low back pain

D. Griswold^a, F. Gargano^b and K. E. Learman^a

^aDepartment of Physical Therapy, Youngstown State University, Youngstown, OH, USA; ^bPresident of Integrative Dry Needling, Solon, OH, USA

ABSTRACT

Objective: The purpose of this study was to examine the within and between-group effects of segmental and distal dry needling (DN) without needle manipulation to a semi-standardized non-thrust manipulation (NTM) targeting the symptomatic spinal level for patients with non-specific low back pain (NSLBP).

Methods: Sixty-five patients with NSLBP were randomized to receive either DN ($n = 30$) or NTM ($n = 35$) for six sessions over 3 weeks. Outcomes collected included the Oswestry disability index (ODI), patient specific functional scale (PSFS), numeric pain rating scale (NPRS), and pain pressure thresholds (PPT). At discharge, patients perceived recovery was assessed.

Results: A two-way mixed model ANOVA demonstrated that there was no group*time interaction for PSFS ($p = 0.26$), ODI ($p = 0.57$), NPRS ($p = 0.69$), and PPT ($p = 0.51$). There was significant within group effects for PSFS (3.1 [2.4, 3.8], $p = 0.018$), ODI (14.5% [10.0%, 19.0%], $p = 0.015$), NPRS (2.2 [1.5, 2.8], $p = 0.009$), but not for PPT (3.3 [0.5, 6.0], $p = 0.20$).

Discussion: The between-group effects were neither clinically nor statistically significant. The within group effects were both significant and exceeded the reported minimum clinically important differences for the outcomes tools except the PPT. DN and NTM produced comparable outcomes in this sample of patients with NSLBP.

Level of evidence: 1b

KEYWORDS

Low back pain; manual therapy; dry needling

Introduction

Low back pain (LBP) is common with annual incidence rates ranging from 15% to 45% [1], and lifetime prevalence rates as high as 84% [2]. Non-specific LBP (NSLBP) is back pain without an identified medical source [3]. Estimates suggest 85% of back pain is associated with myofascial pain syndrome (MPS) [4]. Spinal conditions that coexist with MPS include radiculopathies [5], spondylosis [6], zygapophyseal joint dysfunction [7], and discogenic pathologies [8]. Regardless the source of pain, persistent peripheral nociception can lead to more diffuse neurochemical involvement resulting from neurogenic inflammation [9] and segmental sensitization [10] creating a larger nociceptive field.

Myofascial trigger points (MTrPs) [11], defined as hyperalgesic taut myofascial bands producing referred or localized pain [12], are used to diagnosis MPS. Significant variation exists concerning the criteria for identifying a MTrP, however, production of pain recognition or tenderness using palpation are the most reliable features [13]. Controversy regarding the pathophysiology [14] and diagnosis [15] of MPS, as well as the lack of consistency with localizing a MTrP [13] is well documented. Research suggests MTrP may not

only involve a local muscular phenomena [16] but a pervading constellation of symptomology involving peripheral and central nervous system sensitization [17,18], somatic-visceral interplay [19], impaired micro-circulation [20,21], and proliferation of inflammatory mediators [22].

The Federation of State Boards of Physical Therapy defined dry needling (DN) as, 'a skilled technique performed by a physical therapist using filiform needles to penetrate the skin and/or underlying tissues to affect change in body structures and functions for the evaluation and management of neuro-musculoskeletal conditions, pain, movement impairments, and disability' [23]. The MTrP model is one approach to DN involving palpation for local foci in skeletal muscle tissue and deactivating it through repeated manipulation (pistoning) of the needle, eliciting and fatiguing a local twitch response (LTR) [24]. Other models [25,26] describe MTrP as a symptom of neurogenic irritation and segmental sensitization where DN is targeted to spinal roots associated with the patients symptoms [25] and innervation fields of peripheral nerves [26]. Innervation fields are areas of cutaneous or motor peripheral nerve supply. These models may include but do not necessitate targeting MTrP, needle manipulation, or exhausting a LTR. Studies have shown

that local [27,28] segmental [29–32], and distal needling [33,34] reduces pain and disability in MPS, however, the majority of clinical studies involving DN have only investigated the local MTrP approach [28,35].

Manual therapy techniques are recommended by clinical practice guidelines as part of a comprehensive treatment plan to assist patients in managing their LBP [36]. Non-thrust manipulations (NTMs), defined as repetitive, rhythmic, passive oscillatory movement, applied with either small or large amplitude to a symptomatic spinal level [37], is one type of manual therapy. Evidence has consistently demonstrated the clinical benefits of NTM for reducing pain and disability associated with LBP [38–41].

Although both DN [16,42] and NTM [43,44] share some similar physiological mechanisms that may alter the local and diffused neurochemical effects following injury, the use of a needle creates a mechanical effect [45,46] altering neurochemistry [16] to deeper tissue structures that may provide an enhanced analgesic response [47,48]. Although some mechanical effects may occur from manual therapy, neurophysiological changes are likely responsible for those effects rather than connective tissue changes following tissue-specific manual therapy interventions [44].

To our knowledge, no studies have directly compared DN to other forms of manual therapy for NSLBP. Investigating the effects of DN beyond the MTrP model may help to broaden the application of DN. Also, the effect of DN without needle manipulation on pain and disability measures is unknown and may be of interest to clinicians encountering patients who do not tolerate manipulation of the needle.

Objectives

The purpose of this study was to compare segmental and distal DN without needle manipulation to a semi-standardized NTM targeting the symptomatic spinal level for patients with NSLBP. Within group results will also be reported to provide effect sizes for both groups. We hypothesized there would be no significant between-group differences between patients with NSLBP who received segmental and distal DN versus NTM targeting the symptomatic spinal level.

Methods

This clinical trial was approved by The Human Subjects/Institutional Review Board at Youngstown State University and registered with www.clinicaltrials.gov #NCT02312895. Prior to baseline measures, all patients read and signed an informed consent.

Participants

Patients were recruited from one clinic and one university site between December 2014 and May 2018. Patients

18–70 years old, with a chief complaint of reproducible LBP present for at least six weeks, and scored $\geq 20\%$ on the Oswestry Disability Index (ODI) were included. Patients were excluded if the examining clinician was unable to provoke patient's symptoms along the lumbar paraspinal muscles and with passive accessory intervertebral movement (PAIVM) of the lumbar spine. Additionally, patients were excluded if they reported $< 2/10$ on the numeric pain rating scale (NPRS) 24 h average, had any red flags revealed during the patient history (i.e. tumor, metabolic diseases, RA, osteoporosis, prolonged history of steroid use, prior lumbar surgery, current pregnancy) or examination (i.e. signs consistent with significant nerve root compression), had a medical history of a transmittable blood disease, demonstrated signs of Chronic Regional Pain Syndrome, were seeking litigation for their pain, were unable to speak English, and/or have been diagnosed with fibromyalgia.

Treating clinician

Two physical therapists with an average of 9 years clinical experience practicing manual therapy conducted the clinical examination and provided treatment. Clinicians met and reviewed the study protocol for consistent implementation of the methods and treatment parameters. Clinicians were experienced with examination procedures for identifying the symptomatic level through pain provocation. The same treating clinicians followed up with the patients at each session and were blinded to results of the outcome measures.

Examination

A blinded clinician collected data used for eligibility screening using results from the outcome measures. Patients provided their demographic information and completed the self-report outcome tools. The Tampa scale for kinesiophobia (TSK) [49] was used to measure the presence of cognitive-behavioral factors believed to impact pain and disability outcomes associated with chronic LBP [50]. The TSK consists of 17 items that evaluate fear of movement and (re) injury using a Likert-type scale ranging from strongly agrees to strongly disagrees [49]. The TSK has acceptable psychometric properties for measuring cognitive-behavioral aspects of chronic LBP [51]. Scores on the TSK range from 17 to 68 with a score of ≥ 37 considered higher level of fear avoided behaviors [52]. The Leeds assessment of neuropathic symptoms and signs pain scale (LANSS) [53] was used to screen for the presence of neuropathic pain. The LANSS involves scoring five pain symptom-related questions and two sensory exam outcomes with scores ≥ 12 indicating a stronger likelihood for the presence of neuropathic pain [54]. Pain pressure threshold (PPT) was collected at the most tender/sympathetic area in the lumbar spine.

A comprehensive physical therapy examination was performed on all patients that included; lumbar active range of motion, PAIVM testing, strength testing, and paraspinal palpation. Specificity for segmental mobility testing using PAIVMs [55,56] and palpating for MTrP [13,57] lack sufficient reliability. PAVIMs and paraspinal palpation were performed with the purpose of symptom provocation which is suggested to be the most reliable method for determining the location of dysfunction [58]. The examining clinician marked the symptomatic area with a skin pen used for measuring PPT. Clinicians were able to incorporate additional examination tests to assist with their decision-making and to ensure that all patients fit the eligibility criteria.

Randomization

A computerized random number generator produced the randomization schedule ahead of data collection. Concealed allocation was performed using an opaque envelope that was placed in each patient's chart. Following the clinical examination and collection of initial outcome measures, the treating clinician opened the envelope and determined the patient's group allocation. Patients were treated according to their group assignment for all six visits.

Interventions

Each patient received a treatment plan that consisted of two visits per week for three weeks totaling six visits. Treating clinicians identified the most symptomatic level in the lumbar spine that was targeted for either NTM or DN. A standardized home exercise program (HEP) was completed daily by patients.

Dry needling

Fifty millimeter (mm)/.25 gauge Seirin J-type needles were inserted to the maximum or available depth at each location. Segmental DN involved needling the paraspinal levels [29,30] and then distally into peripheral nerve innervation fields of the lower extremity [26]. Two needles were placed along bilateral lumbar paraspinal muscles at the symptomatic level, a level above, and a level below. Needles were then inserted into both lower extremities targeting peripheral nerve distributions [26]. Needling distal to the primary site of pain reduces neural sensitivity through attenuating the spinal reflex arc [32–34,59]. Twenty-two needles were used each visit and total treatment time ranged between 5 and 7 min depending on patient tolerance. See Figure 1. No manipulation of the needle was performed other than slight modifications needed to reach the 50 mm or maximum available depth. Once all needles were inserted, the therapist removed them.

Non-thrust manipulation

Patients allocated to the NTM group received a semi-standardized approach targeting the symptomatic level in the lumbar spine. See Figure 2. The technique and grade of the NTM was at the discretion of the clinician and based on the findings from the clinical examination. The number of bouts and duration of each bout for the NTM was standardized to include three bouts performed for 45 s with 45 s in between.

Other interventions

A standardized HEP consisting of mobility and stabilization exercises of the lumbo-pelvic area was reviewed at their initial visit. Each participant was asked to complete the program one time per day during his or her participation in the trial. Adherence was monitored using an exercise log with a threshold set at 80% considered successful.

Outcome measures

The primary outcome for this study was the modified ODI [60]. The ODI is a 10-question self-report measure that assesses the impact of the patient's pain on their ability to perform everyday activities. The ODI has been found to be reliable ($r = 0.94$ – 0.99) and valid with adequate responsiveness to change [61]. The ODI was collected at baseline, visit 2, visit 4, and visit 6.

Secondary outcomes included the NPRS 24-hour average for pain, the patient specific functional scale (PSFS) score, PPT, and the single assessment numeric evaluation (SANE) percent recovery. The NPRS and PSFS score were assessed at baseline, visit two, visit four, and visit six. PPT was taken pre and post baseline, visit two, visit four, and visit six. The SANE for determining rate of recovery was recorded at visit six.

The NPRS was used to assess the perceived level of pain [62]. The NPRS is an 11-point scale ranging from 0 (no pain) to 10 (worst imaginable pain). The patient was instructed to provide their current, worst, and best pain scores over the past 24 h and a composite average is calculated. A two point reduction on the NPRS has been reported to be a clinically significant for patients with LBP [63].

The PSFS [64] is a patient identified self-report questionnaire that measures general activity limitations. The scale ranges from 0 (unable to perform) to 10 (able to perform the activity at the level prior to injury). The patient reports 3 activities and rates each activity from 0 to 10, which are averaged for a composite score. The PSFS has excellent test-retest reliability ($ICC = 0.91$) [65]. The minimal detectable change (MDC) for the PSFS score has been reported 1.4 points [66] and an MCID of 2 points for patients with chronic LBP [67].

Figure 1. Dry needling protocol at the symptomatic level of lumbar spine, level above, and level below. (1) Lower extremity innervation zones needled represented by dots. (2).

Figure 2. Non-thrust manipulation.

PPT was measured over the most sensitive spot of the lumbar spine marked by the treating clinician following the physical exam. Three trials using a Wagner

FDX 50 [™] (Greenwich, CT) with 1.0 cm dial were performed and averaged for a composite score recorded in lbs. The test-retest intra-rater reliability for PPT was reported to be excellent ($ICC_{3,3} = .99$) for subjects with symptomatic LBP [68].

Rate of recovery using the SANE was determined by the subject's response to the question: 'How would you rate your LBP today as a percentage of normal?' using a 0% to 100% scale with 100% being normal [69]. The SANE correlates well with the ODI and the minimally clinical important difference MCID of 82.5% was reported for patients with LBP [70].

Sample size estimation

An a priori sample size estimation was conducted using G*power[©] (Dusseldorf, Germany), selecting a two-way mixed model, ANOVA with two groups and four time points. A calculated sample size of 60 patients provided 80% power to detect a 20% between-group difference on the ODI with the α set at .05.

Data analysis

Data for this study were analyzed using SPSS version 20.0 (IBM, Armonk, NY). An intention-to-treat analysis included all patients in the analysis who were randomized. Between-group comparisons for the ODI, PSFS score, NPRS, and PPT were assessed using a two-way mixed model analysis of the variance (ANOVA) at baseline and visits two, four, and six or discharge. Individual analyses were done for each of the outcome variables. The fixed factor was the group variable and the visit served as the random factor. The SANE was analyzed with an independent *t*-test. Within group effects were measured with the two-way mixed model ANOVA.

Results

Eighty-three patients were screened for eligibility and 65 were randomized to receive either NTM or DN. Eighteen participants were excluded with 15 not meeting the eligibility criteria and 3 having contraindication to the treatments. Five patients in the NTM group and three in the DN group were lost to follow-up sessions. Figure 3 includes a flow diagram for participant

recruitment and retention. Baseline characteristics for both groups are provided in Table 1.

The results of the two-way mixed model ANOVA suggest there was no statistically significant group*time interaction for PSFS ($p = 0.26$), ODI ($p = 0.57$), NPRS ($p = 0.69$), and PPT ($p = 0.51$). There were no significant between-group differences for any of the dependent variables for visits two, four, or six. The measured mean group differences with 95% confidence intervals have been provided in Table 2 and presented in Figures 4 and 5. Additionally, there was no between-group differences for the SANE ($p = 0.91$).

The two-way mixed model ANOVA demonstrated significant within group main effect for PSFS ($p = 0.018$), ODI ($p = 0.015$), NPRS ($p = 0.009$), but not for PPT ($p = 0.20$). The measured within group differences and 95% CI have been provided in Table 3.

Discussion

To our knowledge, this is the first study to compare NTM to DN for patients with NSLBP. The results of this clinical trial indicated no between-group differences

Figure 3. CONSORT flow diagram.

Table 1. Subject characteristics at baseline.

	Dry needling group (n = 30)	Non-thrust manipulation group (n = 35)	p-Value
Age	45.0 (14.4)	49.6 (13.8)	0.19
Gender	Female = 60.0%	Female = 42.9%	0.17
Height (in.)	67.4 (4.3)	67.2 (3.9)	0.80
Weight (lbs)	182.1 (40.2)	184.1 (42.8)	0.85
BMI (kg/m ²)	28.2 (6.3)	28.6 (7.0)	0.79
Duration of symptoms	86.5 (223.4)	114.4 (214.6)	0.62
Initial PSFS	3.8 (1.9)	4.7 (1.3)	0.028
Initial ODI (%)	31.3 (12.9)	24.7 (9.8)	0.023
Initial NPRS-24	4.8 (1.9)	4.6 (1.6)	0.59
Initial PPT (lbs)	13.7 (6.4)	12.8 (7.4)	0.59
TSK	37.8 (8.6)	39.2 (6.8)	0.49
+TSK	20/30 (66.7%)	24/35 (68.6%)	
LANSS	1.8 (2.2)	4.3 (8.8)	0.08
+LANSS	0/30 (0.0%)	0/35 (0.0%)	

BMI: bodymass index; NPRS: numeric pain rating scale; ODI: oswestry disability index; PSFS: patient specific functional scale; PPT: pressure pain threshold; TSK: Tampa scale of kinesiphobia; +TSK ≥ 37 ; LANSS: Leeds assessment of neuropathic symptoms and signs pain scale; +LANSS ≥ 12 .

for patients with NSLBP who received segmental and distal DN without needle manipulation or semi-standardized NTM targeting the symptomatic spinal level. See Table 2 for between-group adjusted mean differences at all time points. Both groups attained clinically and statistically meaningful changes in pain and disability at all time points. See Table 3 for follow-up outcomes data for within group effects, with mean differences and confidence intervals.

Both groups reported at least a 50% change score on the ODI previously found to be clinically meaningful [71]. Although not significant, patients who received DN reported greater improvement on the ODI with a mean change score of $16.9\% \pm 13.3\%$ compared to NTM group reporting a mean change score of $12.1\% \pm 10.6\%$. Patients in the DN group reported a mean change using the NPRS 24 h average of 2.5 ± 1.9 and the NTM reported 1.9 ± 1.7 . Mean improvements on the PSFS score for patients receiving DN were 5.7 ± 2 points and those receiving NTM reporting an average improvement of 2.4 ± 1.3 . It should be noted,

however, the DN group had both higher ODI and lower PSFS baseline scores. Both groups reported similar outcomes on the SANE. Those patients receiving DN reported mean scores of 67.5% (SD : 31.1) and NTM 66.6% (SD : 29.1) The PPT improved more for those who received NTM (4.6 lbs.) compared to those who received DN (1.9 bs.).

Several reasons may help explain within group changes that occurred in our sample. Both NTM [43,44,72] and DN [23,42,73] activate neurophysiological and neuro-inflammatory effects occurring locally, segmentally, and at supra spinal levels that could contribute to improvements in pain and disability. The majority of scientific evidence investigating these physiological effects from DN was discovered using needle manipulation [23,42,73]. Albeit to a lesser degree as the therapeutic dosage was smaller, it is still plausible that basic needle insertion without manipulation of the needle creates neuro-inhibitory pain mechanisms, generates a mechanical effect, and improves the patho-physiological state of tissue associated with pain.

Other components of care patients received could have also attributed to improvements in the clinical outcomes. The use of an exercise program could partially account for some treatment effect in the outcomes [74]. Patients' adherence rate with the HEP was 83%, similar to another trial specifically looking at HEP adherence rates in chronic LBP [75]. Considering patient expectations, a placebo effect may have contributed to improvements in pain and disability measures [76]. Lastly, patient-clinician interaction is also likely to account for some effect in improvements [77].

The DN performed in this study varied from the traditional MTrP DN. Clinicians targeted the DN to the symptomatic lumbar segment, adjacent levels, and peripheral nerve innervation fields in the lower extremity as suggested by Ma [26]. This approach is supported by studies demonstrating that in addition to needling directly at the primary site of pain [59,78,79],

Table 2. Follow-up outcome data for groups, with mean differences and confidence intervals.

	Dry needling group (n = 30)	Non-thrust manipulation group (n = 35)	Mean difference	p-Value
Visit 2 follow-up				
PSFS	5.5 (2.3)	5.5 (1.9)	-0.05 [-1.14, 1.04]	0.17
ODI (%)	22.5 (14.8)	21.6 (10.6)	0.87 [-5.77, 7.51]	0.79
NPRS-24	3.6 (1.8)	3.6 (2.0)	0.07 [-0.91, 1.06]	0.88
PPT (lbs)	16.7 (8.9)	14.3 (6.5)	2.39 [-1.61, 6.40]	0.24
Visit 4 follow-up				
PSFS	6.1 (2.3)	6.4 (2.0)	-0.26 [-1.39, 0.87]	0.65
ODI (%)	18.8 (15.4)	17.1 (10.7)	1.69 [-5.35, 8.73]	0.63
NPRS-24	3.4 (1.8)	2.9 (1.8)	0.48 [-0.48, 1.43]	0.32
PPT (lbs)	15.6 (7.4)	15.9 (7.5)	0.69 [-3.30, 4.69]	0.73
Visit 6 follow-up				
PSFS	7.6 (2.2)	7.1 (1.3)	0.52 [-0.54, 1.58]	0.33
ODI (%)	14.4 (13.7)	12.6 (11.4)	1.84 [-4.86, 8.54]	0.58
NPRS-24	2.3 (1.9)	2.7 (1.9)	-0.33 [-1.33, 0.68]	0.52
PPT (lbs)	15.6 (7.1)	17.4 (9.4)	-1.89 [-6.39, 2.61]	0.40
SANE %	67.5 (31.1)	66.6 (29.1)	0.94 [-14.6, 16.5]	0.91

PSFS: patient specific functional scale; ODI: oswestry disability Index; NPRS: numeric pain rating scale; PPT: pressure pain threshold; SANE: single assessment numeric examination. *Data are mean and (standard deviation)

Figure 4. Between-group differences for mean scores on the ODI at baseline, visit 2, visit 4, and visit 6. Error bars represent the 95% confidence interval for mean scores. Between-group differences existed at baseline but no other time point.

Figure 5. Between-group differences on the NPRS for mean scores at baseline, visit 2, visit 4, and visit 6. Error bars represent the 95% confidence interval for mean scores. No between-group differences existed at any time points.

segmental [29–31], and distal needling [33,80] also produce anti-nociceptive effects.

Manipulation of the needles via rotation or pistoning may have resulted in greater improvements in those receiving DN by enhancing the mechanical transduction inducing connective tissue changes [46] or eliciting a LTR for pain reduction [81–83]. Although the presence of a LTR may be more effective in reducing pain and disability in some patients with MPS [81–83], literature [84–89] suggests other needling techniques not aimed at eliciting a LTR are also effective. Moreover, although patients with LBP treated with DN who experienced LTR, compared to no LTR, had temporary improvements in sensorimotor function of multifidus, no between-group difference was reported with pain, sensitivity, or disability levels [90]. Exhausting the LTR has been associated with higher levels of inflammation [91] and subsequently more post-treatment soreness [33,81,92,93]. It is unknown if or how many patients experienced a LTR in our sample since this variable was not collected nor is it always observable in the lumbar spine [94]. Nonetheless, needle

Table 3. Follow-up outcomes data for within group effects, with mean differences and confidence intervals.

	Baseline score	Visit-6 follow-up	Mean difference	p-Value
Dry needling group (n = 30)				
PSFS	3.8 (1.9)	7.6 (2.2)	*3.76 [2.80, 4.73]	<0.001
ODI (%)	31.3 (12.9)	14.4 (13.7)	*17.24 [12.27, 22.21]	<0.001
NPRS-24	4.8 (1.9)	2.3 (1.9)	*2.46 [1.63, 3.30]	<0.001
PPT (lbs)	13.7 (6.4)	15.6 (7.1)	\$2.15 [0.24, -4.55]	0.076
Non-thrust manipulation group (n = 35)				
PSFS	4.7 (1.3)	7.1 (1.3)	*2.40 [1.58, 3.22]	<0.001
ODI (%)	24.7 (9.8)	12.6 (11.4)	*10.57 [6.92, 14.23]	<0.001
NPRS-24	4.6 (1.6)	2.7 (1.9)	*1.70 [0.96, 2.43]	<0.001
PPT (lbs)	12.8 (7.4)	17.4 (9.4)	\$4.61 [1.09, 8.13]	0.012

PSFS: patient specific functional scale; ODI: oswestry disability index; NPRS: numeric pain rating scale; PPT: pressure pain threshold; SANE: single assessment numeric examination. *exceeds the minimum clinically important difference. \$MCID not established

delivery was done in a way not intended to elicit a LTR (repetitive in/out procedure), therefore, we suspect the number would be minimal. Interestingly, significant changes in pain and disability occurred in our sample with no needle manipulation.

We elected to use a semi-standardized NTM to minimize variability in the dosage but still allow some decision-making from the clinician by selecting the technique and grade. Although it is possible that clinician selected dosage may produce better outcomes, prescriptively applied NTM has been shown to produce similar outcomes on pain and disability for patients with LBP [95]. Our study results demonstrating no between-group differences while comparing two forms of manual therapy is not uncommon [39,96–98]. Various manual therapy techniques share similar clinical mechanisms explaining these results [43,44]. Future studies may attempt to identify patient factors or clinical indicators suggestive as to what patients are more likely to have success with specific types of manual therapy. Additionally, future DN studies may look to investigate the physiological and mechanical effects of DN without needle manipulation.

Limitations

There are limitations of this study to consider. First, the treatments provided were semi-standardized and may not be generalizable to clinical practice. The eligibility criteria used for patient enrollment may not have been stringent enough to delineate patients who more likely to respond to the interventions. This study assessed only the short-term effects and it is unknown if the gains achieved from the interventions

would have been maintained over the long-term. Lastly, we did not include a control or sham group.

Conclusion

Results of this RCT indicated no between-group differences between patients experiencing NSLBP who received a semi-standardized NTM or a segmental and distal DN approach without needle manipulation. Our results indicate both NTM and DN produce meaningful within group changes for pain, disability, and perceived recovery for patients with NSLBP. Either treatment could be considered for conservative management strategies for NSLBP.

Relevant findings:

- (1) Clinicians may consider various applications of DN including segmental and distal needling for treating NSLBP.
- (2) Basic DN technique without manipulation may be considered for patients who do not tolerate manipulation of the needle when applied segmentally and distally for NSLBP.
- (3) Semi-standardized NTM and segmental and distal DN without needle manipulation produce meaningful changes in pain and disability. Both can be effective treatment options for patients with NSLBP.

Disclosure statement

David Griswold is an instructor for and Frank Gargano is the President of Integrative Dry needling.

Notes on contributors

David Griswold, DPT, PhD is an Associate Professor of Physical Therapy at Youngstown State University in Youngstown, OH. He received his DPT from Youngstown State University, PhD in Physical Therapy from Nova Southeastern University, and holds three nationally recognized certifications in orthopedic manual therapy. He is a national instructor for Integrative Dry Needling Institute Seminars.

Frank Gargano, DPT, OCS has 29 years of experience as an Orthopedic Physical Therapist in private practice. He provides continuing education seminars nationally and internationally on the topics of manual therapy, and dry needling. He is the owner and President of the Integrative Dry Needling Institute.

Kenneth E. Learman, PT, PhD is a Professor of Physical Therapy at Youngstown State University in Youngstown, Ohio. He received his BSPT at SUNY- Bu alo, his MEd in Health Education at Penn State University and his PhD in Sports Medicine at the University of Pittsburgh. In addition, Ken is a board certified specialist in orthopedic physical therapy, a certified orthopedic manual therapist through Maitland-Australian Physiotherapy Seminars (MAPS), and a fellow in the American Academy of Orthopedic Manual Physical Therapists.

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