Randomized Trial

Effect of Dry Needling Injection and Kinesiotaping on Pain and Quality of Life in Patients with Mechanical Neck Pain

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Background: Dry needling (DN) is a commonly used technique by clinicians for the treatment of mechanical neck pain (MNP) by targeting trigger points and nontrigger point structures. It is a skilled intervention that uses a thin filiform needle to penetrate the skin and stimulate underlying trigger points, muscular and connective tissues without the use of injectate. Another popular treatment technique used in the management of musculoskeletal pathologies is kinesiotaping (KT). Although its popular, there is minimal scientific evidence supporting KT for neck pain. Although there are a few studies regarding KT for neck pain in literature, there is a lack of randomized, controlled studies evaluating KT for neck pain.

Objectives: To evaluate the effect of KT on posterior cervical spine and DN into a posterior paracervical muscle of patients with MNP.

Study Design: Randomized clinical study.

Setting: Physical medicine and rehabilitation center.

Methods: Seventy-two patients (17 men, 55 women) were randomly assigned to DN or KT treatment groups. Numeric Rating Scale (NPS-11), Neck Disability Index (NDI), range of motion (ROM), Short Form-36 Quality of Life Scale, and Beck Depression Inventory (BDI) were assessed before the intervention and one month postintervention.

Results: Before treatment, there was no difference between groups in NPS-11, NDI, and BDI scores; however, ROM of the DN group was greater than ROM of the KT group ($P < 0.05$). After treatment, significant improvement was observed in all variables for both of the groups, except ROM in the DN group ($P < 0.05$). The KT group showed greater ROM compared with the DN group ($P < 0.05$). The pre- and posttreatment results showed that the KT group was significantly superior for the differences on ROM and NDI ($P < 0.05$); however, each group showed better results after treatment ($P < 0.05$).

Limitations: First, we did not include a control or placebo group. Second, patients were followed up for only 4 weeks. Third, we used a sample of convenience from one clinic, which may not be representative of the entire population of individuals with MNP.

Conclusions: In this study, both methods were found to be effective on pain, mood, and quality of life, and KT was found to be superior to DN in MNP in terms of increasing ROM and decreasing disability.

Key words: Dry needling, kinesiotaping, mechanical neck pain, quality of life

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Neck pain is a major public health care problem, with the prevalence of neck pain in the general population ranging from 16.7% to 75.1% (mean 37.2%) and a lifetime prevalence of 48.5% (1,2). Mechanical neck pain (MNP) was defined as generalized neck pain and/or shoulder pain with mechanical features including symptoms aggravated by maintained neck posture, movement or palpation

of cervical musculature (3). The etiology of MNP is not clear, however, it is thought to be multifactorial. Various cervical structures, such as uncovertebral and intervertebral joints, neural tissues, discs, muscles or ligaments may be the source of neck pain. It is also claimed that myofascial trigger points localized in different head, neck, shoulder or upper back muscles, and paracervical muscle spasm may be responsible for MNP (2).

Dry needling (DN) is a commonly used technique by clinicians for the treatment of MNP, by targeting trigger points and nontrigger point structures (4-11). It is a skilled intervention that uses a thin filiform needle to penetrate the skin and stimulate underlying trigger points, muscular and connective tissues without the use of injectate (12). Another popular treatment technique used in the management of musculoskeletal pathologies is kinesiotaping (KT). Although it is popular, there is minimal scientific evidence supporting KT for neck pain (13-15). There are a few studies in literature, one of them investigating the effect of KT on clinical parameters in patients with whiplash injury (13). The other one compared the impact of cervical spine thrust manipulation and KT in patients with MNP (14).

To the best of our knowledge, there is no study assessing the clinical effectiveness of KT versus DN in neck pain in the literature. Therefore, the purpose of this study was to compare the effects of KT and DN in MNP with regards to pain intensity, range of motion (ROM), disability, quality of life, and depressive symptoms.

Methods

Patients who have been admitted to our physical medicine and rehabilitation center with neck pain provoked by neck postures, neck movement, or palpation of the cervical musculature without any trauma were enrolled between December 2013 to September 2014. All the study patients gave written informed consent, and hospital ethical committee approval was obtained, which was performed in accordance with the Helsinki Declaration.

The demographic data of the patients including age, gender, marital status, occupation, educational level, cigarette smoking, alcohol consumption, body mass index, and duration of neck pain were recorded. MNP diagnosis was made clinically by medical history (defined as pain in the area between the neck and/or shoulder regions) and physical examination (in whom neck movement or palpation of the cervical region could provoke their symptoms) (15,16). Patients with the following conditions were excluded: those having neurologic deficits, medical diagnosis of cervical radiculopathy or myelopathy, evidence of central nervous system involvement and signs consistent with nerve root compression, history of whiplash injury, history of cervical spine or shoulder surgery, having a diagnosis of fibromyalgia syndrome, any 'red flags' (malignancy, inflammatory arthritis, fracture, osteoporosis, and others), previous injection, KT applications or physical therapy for neck region in the last 6 months, any type of allergy, and receiving anticoagulant medication or any other contraindication to injection.

Patients were randomly (via sealed envelopes method) divided into 2 groups: DN injection and KT group. Nonsteroidal antiinflammatory drugs and myorelaxants were not permitted during the study period. Patients in both groups were taught a home-based standardized exercise program (10 repetitions of one set daily for each exercise), which consisted of stretching and strengthening of the neck and upper back muscles, reeducation of neutral posture, and retraining of the scapular muscles, with 5 sessions per week for 4 weeks (17). All patients were evaluated on how they performed exercises once a week. To avoid bias, clinical examination/assessment (S.B.), KT application (Z.Ş.: a certified, 3-year experienced KT practitioner), and the DN injection (Ş.Ş.O.) were performed by a different physiatrists. The patients were supervised to ensure that exercises were performed correctly and or weekly. Patients were evaluated before (baseline) and after the treatment (fourth week).

Intervention

DN Injection

Needling sites were specified by the physician following assessment of hyperalgesia on palpation. The posterior muscles of the cervical spine were treated while the patients were lying prone. The needle was moved backward and forward, and the same point was needled 6 to 8 times. After injection, the injected area was compressed firmly for at least 10 minutes to achieve hemostasis. DN injection was performed once a week for 4 weeks (17). Last assessments were performed one day after the last DN session.

KT Application

A 50 × 0.5 mm tape (Kinesio Tex; Kinesio USA, Albuquerque, NM) used in this study was waterproof, porous, and adhesive. KT application is shown in Fig.

1. The first layer of tape, a Y-strip, was placed over the posterior cervical extensor muscles, from the insertion to the origin, by stretching it 15% to 25% of its original length (16). Each tail of the first strip was applied with the patient's neck bending and rotating to the opposite site from the dorsal (T1-T2) to the upper cervical region (C1-C2). The overlying tape, spaced-strip with openings, was placed perpendicular to the Y-strip, over the mid-cervical region (C3-C6), with the patient's cervical spine in flexion to apply tension to the posterior structures (13,14). Patients wore the KT for a 4-week duration (renewed once a week periodically in this time).

Evaluations

Numeric Rating Scale (NPS-11) was used to measure pain intensity. The NPS-11 ranges between 0 and 10 (0: minimum pain, 10: maximum pain). It has been shown to be a reliable and valid tool for the assessment of pain (18). The ROM was measured by using the universal goniometer (19). Neck Disability Index (NDI) was used to detect functional disability. The NDI consists of 10 questions, and total score is between 0 and 50 (20). This form has validity and reliability in Turkish (21).

For quality of life, the Short Form-36 Quality of Life Scale (SF-36 QOLS) was used (22). SF-36 QOLS consists of 8 subscores: physical function, physical role difficulties (PRD), body pain, general perception of health, vitality/energy, social function, mental status role, and mental health. The subscores were calculated separately between 0 and 100 (0: the worst, 100: the best health status). The scores of the 2 main components (physical score and mental score) were also evaluated. The Turkish validation was performed by Koçyiğit et al (23). Depressive symptoms were assessed by the Turkish version of the Beck Depression Inventory (BDI). The total score was between 0 and 63. Higher total scores indicate more severe depressive symptoms (24,25).

Statistical Analyses

All statistical calculations were performed using SPSS Version 16.00 (SPSS Inc., Chicago, IL). The Kolmogorov–Smirnov test was used to assess the normality of distribution. The chi-square test was used to compare the distribution of categorical variables. We used a paired sample t test for analyzing pre- and posttreatment outcomes for each within group, and independent sample t test for analyzing between group. Significance level was set at $P \leq 0.05$ with a 95% confidence interval.

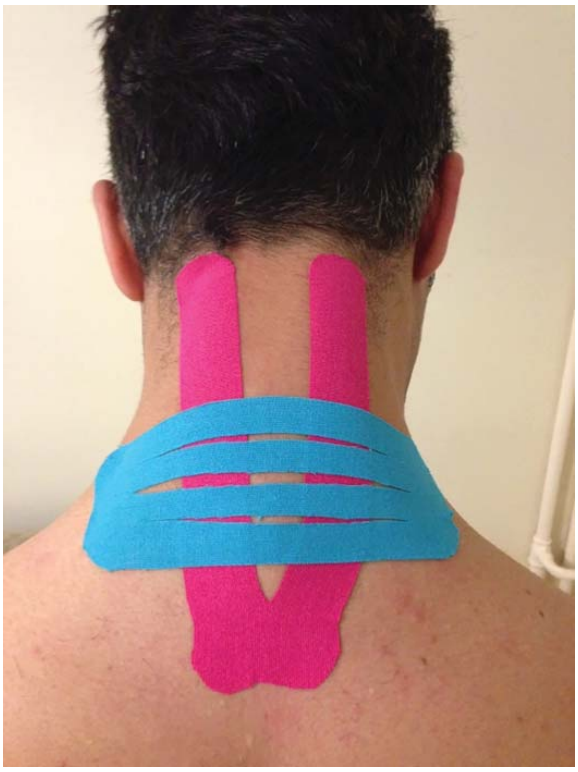

Fig.1. *KT application.*

Results

In total, 72 patients (17 men, 55 women) were included in this study. The comparison of baseline characteristics and clinical parameters of the groups are given in Table 1. According to this, there are no significant differences between the groups in any of these parameters, except ROM ($P > 0.05$). The mean baseline ROM of the DN group was found in more than the mean of those of the KT group ($P < 0.05$).

The comparison of the assessment results within groups are summarized in Table 2. As a result, in comparison to baseline within each group, significant improvements were observed in all clinical variables (except ROM in the DN group) ($P < 0.05$). There was no statistically significant difference between baseline and fourth-week ROM measurements in the DN group (all $P > 0.05$).

According to baseline values, the changes in outcome scores (Δ) with treatment are demonstrated in Table 3. Significant differences in Δ changes were

Table 1. *The comparison of baseline characteristics and clinical parameters of the groups.*

	DN Group (n = 36)	KT Group (n = 36)	*P* Value
Age (years)	44.1 ± 14.2	45.1 ± 12.5	0.740
Gender			
Male/female	7/29	10/26	0.405
Marital status			
Married/widowed	29/7	24/12	0.181
Occupation			
Active working/not active working	12/24	10/26	0.652
Educational level			
Primary/high school/ university	18/9/9	14/8/14	0.439
Cigarette smoking			
Smoker/nonsmoker	27/9	32/4	0.126
Alcohol consumption			
Social drinker/nephalist	1/35	2/34	0.555
Body mass index (kg/m^2)	28.0 ± 5.2	26.3 ± 4.1	0.135
Duration of pain (days)	25.8 ± 8.6	26.4 ± 9.0	0.927
NPS-11			
Daytime	6.4 ± 1.6	6.8 ± 1.6	0.315
Nighttime	5.7 ± 2.7	5.0 ± 3.0	0.354
ROM (degrees)			
Flexion	68.0 ± 6.2	57.7 ± 13.9	0.0001
Extension	58.3 ± 6.9	52.2 ± 9.5	0.003
Right LF	43.6 ± 4.2	39.0 ± 7.6	0.002
Left LF	43.9 ± 3.6	38.8 ± 7.8	0.001
Right rotation	77.5 ± 10.5	65.5 ± 17.4	0.001
Left rotation	76.3 ± 13.3	65.5 ± 17.1	0.004
NDI	13.4 ± 4.9	14.6 ± 6.9	0.417
BDI	12.7 ± 8.3	13.3 ± 6.9	0.726

Data are given as ratio or mean ± standard deviation.
Abbreviation: LF, lateral flexion.

found in ROM and NDI scores between the groups ($P < 0.05$). There were no statistically significant differences in Δ changes by means of the NPS-11, SF-36 QOLS (except PRD subgroups score), and BDI scores ($P > 0.05$).

In this study, 5 patients reported minor reversible (resolved within 24 hours) adverse events, with 3 in the injection group (8.3%) (minor increase in neck pain after the injection), and 2 in the KT group (5.5%) (cutaneous irritation). These patients were not excluded from the study.

Discussion

This study revealed that both DN and KT are effective treatments for pain, quality of life, and depression in patients with MNP, but also KT is significantly superior to DN in improving ROM and disability.

In the literature, the efficiency of DN in MNP has been studied many times, but evidence regarding the efficiency of KT was more limited. In our study, DN was observed as an efficient method for improving pain, disability, quality of life, and depressive symptoms in MNP as in the previous studies (4-11). Unlike previous studies, we observed that DN had no effect on ROM. However, González-Iglesias et al (13) observed significant recovery in pain and ROMs of patients with whiplash injury in the KT group when compared with the placebo KT group. We also found that KT may positively influence pain, disability, and ROM similar to the findings of others (13,14). Actually, KT is better for improving ROM and disability. It may be possible that the application of KT provides a proper sensory feedback to the patients, decreasing fear of movement and thus improving ROM. Because the traction in KT lifts the epidermis relieving the pressure on the mechanoreceptors below the dermis, therefore decreasing nociceptive stimuli. Tension in the tape also provides afferent stimuli facilitating pain inhibition mechanisms, thereby contributing to reducing pain levels (13). Additionally, this result may also be because DN is a more invasive and painful procedure than KT.

The authors reported that a negative correlation between a reduction in cervical ROM and disability has been proposed, as compared with those who are without pain (26). Saavedra-Hernández et al (16) showed that decreased cervical ROM were significant predictors of neck pain disability. We found that the change of ROM and disability were similar. Namely, the improvement of ROM can potentially assist clinicians to decrease disability for this group of patients.

Neck pain gives rise to limitations while performing work, recreational, social, and familial activities in 5% of these patients (16). It has been reported that neck pain has also been associated with quality of life (27). However, only one study showed that DN is effective in increasing health-related quality of life in patients with chronic neck pain, as in our study (28), but the KT effect on quality of life has not been determined in neck pain previously. We demonstrated that both DN and KT increased quality of life on MNP. Because neck pain is related to demographic and physiological features, these were determined in our study popula-

tion; however, there were no differences between the 2 groups, so it prevented bias.

Several adverse effects associated with DN have been documented: postneedling soreness, hemorrhages at the needling site, syncopal responses, and acute cervical epidural hematoma (29-30). In our study, minor side effects were observed that did not affect the process of treatment. Additionally, when not only efficacy but also side effects are reviewed, KT may be a better alternative than DN in MNP.

There are some limitations of the study. First, we did not include a control or placebo group. Second, patients were followed up for only 4 weeks. Third, we used a sample of convenience from one clinic, which may not be representative of the entire population of individuals with MNP.

Conclusions

This study showed that both KT and DN had a positive impact on pain, disabil-

Table 2. *The comparison of baseline and posttreatment (fourth week) results within groups.*

	DN Group (n = 36)			KT Group (n = 36)		
	Baseline	Fourth Week	*P* Value	Baseline	Fourth Week	*P* Value
NPS-11						
Daytime	6.4 ± 1.6	3.1 ± 2.4	0.0001	6.8 ± 1.6	2.8 ± 2.4	0.0001
Nighttime	5.7 ± 2.8	2.7 ± 2.8	0.0001	5.1 ± 3.0	2.3 ± 2.7	0.0001
ROM						
Flexion	68.0 ± 6.2	69.1 ± 3.7	0.210	57.8 ± 13.9	63.3 ± 8.6	0.001
Extension	58.3 ± 6.9	59.7 ± 2.91	0.257	52.2 ± 9.5	57.8 ± 5.4	0.0001
Right LF	43.6 ± 4.2	45.0 ± 0.0	0.058	39.0 ± 7.6	45.9 ± 5.6	0.0001
Left LF	43.9 ± 3.6	45.0 ± 0.0	0.073	38.8 ± 7.8	45.9 ± 5.6	0.0001
Right rotation	77.5 ± 10.5	78.9 ± 4.6	0.392	65.5 ± 17.4	78.1 ± 6.1	0.0001
Left rotation	76.3 ± 13.3	79.1 ± 3.7	0.143	65.5 ± 17.1	78.1 ± 6.1	0.0001
NDI	13.4 ± 4.9	6.9 ± 4.9	0.0001	16.8 ± 7.9	5.6 ± 4.4	0.0001
SF-36 QOLS						
PF	45.1 ± 12.1	45.2 ± 9.3	0.0001	42.4 ± 8.3	45.6 ± 9.8	0.035
PRD	42.2 ± 12.2	47.4 ± 9.4	0.001	36.2 ± 10.6	45.8 ± 10.4	0.0001
BP	38.2 ± 7.9	44.0 ± 9.5	0.0001	35.8 ± 5.9	40.2 ± 10.3	0.003
GH	41.0 ± 7.7	43.1 ± 7.5	0.0001	40.7 ± 8.3	42.8 ± 8.16	0.038
V/E	45.1 ± 8.7	46.3 ± 8.3	0.010	42.9 ± 6.9	44.2 ± 6.9	0.037
SF	42.0 ± 9.5	43.2 ± 9.3	0.013	38.7 ± 6.8	40.9 ± 7.8	0.030
MSR	41.7 ± 13.5	45.9 ± 10.2	0.011	33.9 ± 12.2	41.0 ± 12.3	0.005
MH	37.6 ± 11.3	38.7 ± 11.0	0.020	35.7 ± 9.6	37.7 ± 9.4	0.033
PS	39.5 ± 8.2	44.9 ± 6.1	0.0001	39.2 ± 6.8	43.7 ± 8.0	0.006
MS	42.4 ± 10.5	44.9 ± 10.0	0.031	37.3 ± 7.7	39.1 ± 7.3	0.041
BDI	12.7 ± 4.3	11.5 ± 3.5	0.0001	13.3 ± 4.9	10.3 ± 3.1	0.0001

Abbreviations: BP, body pain; GH, general perception of health; LF, lateral flexion; MH, mental health; MS, mental score; MSR, mental status role; PF, physical function; PS, physical score; SF, social function; V/E, vitality/energy.

Table 3. *The comparison of treatment changes (Δ) of the clinical parameters according to baseline values (mean ± SD).*

	DN Group (n = 36)	KT Group (n = 36)	*P* Value
ΔNPS-11			
Daytime	−3.3 ± 1.9	−4.0 ± 2.5	0.159
Nighttime	−2.0 ± 2.0	−1.6 ± 4.3	0.656
ΔROM (degrees)			
Flexion	1.1 ± 5.2	6.3 ± 11.9	0.018*
Extension	1.9 ± 7.1	5.8 ± 8.6	0.043*
Right LF	1.2 ± 4.2	6.8 ± 9.7	0.002*
Left LF	0.9 ± 3.5	7.4 ± 10.4	0.001*
Right rotation	2.5 ± 9.44	12.0 ± 16.6	0.004*
Left rotation	3.3 ± 10.9	14.3 ± 19.7	0.005*
ΔNDI	−6.5 ± 3.9	−10.9 ± 6.5	0.001*
ΔSF-36 QOLS			
PF	8.6 ± 25.5	5.7 ± 7.2	0.510
PRD	6.3 ± 8.7	11.5 ± 12.4	0.047*
BP	5.9 ± 7.2	4.9 ± 8.2	0.589
GH	1.4 ± 2.1	1.5 ± 3.0	0.601
V/E	1.3 ± 2.7	2.0 ± 4.4	0.447
SF	2.5 ± 0.3	2.3 ± 5.8	0.875
MSR	4.8 ± 9.2	9.6 ± 11.6	0.055
MH	1.1 ± 2.7	2.3 ± 3.9	0.139
PS	2.4 ± 5.3	6.6 ± 8.5	0.481
MS	2.5 ± 3.9	3.0 ± 3.8	0.546
ΔBDI	−2.1 ± 4.9	−2.4 ± 3.3	0.801

ity, quality of life, and mood, whereas only KT had a positive impact on ROM. KT was found to be superior to DN in MNP in terms of increasing ROM and decreasing disability. Therefore, KT may be preferred instead of DN, which is a more painful and invasive procedure. Future controlled studies are needed to investigate the evolution of alternative therapeutic options in MNP.

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