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RESEARCH ARTICLE

The effect of conventional physiotherapy and median nerve radiofrequency therapy on kinesiophobia in lumbar facet syndrome

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ABSTRACT

Aim: This study was carried out to investigate the effect of conventional physiotherapy (CPT) and median nerve radiofrequency therapy (MNRFT) on kinesiophobia in patients with lumbar facet syndrome (LFS).

Methods: The sample of this study consisted of 60 patients over 18 with facet joint pain persisting for at least 3 months and unresponsive to medical treatment were included in the study. The patients were divided into CPT and MNRFT groups of 30 patients each according to the treatment they received. The patients were evaluated for pain severity, kinesiophobia, sleep quality, functional status, and depression both before the treatment and one month after the treatment using the Visual Analogue Scale (VAS), Tampa Scale for Kinesiophobia (TKS), Pittsburgh Sleep Quality Index (PSQI), Oswestry Disability Index (ODI) and Beck's Depression Inventory (BDI), respectively.

Results: There was a significant difference between the pre- and post-treatment VAS, PSQI, ODI, and BDE scores in both the CPT and MNRFT groups. Additionally, there was a significant difference between the pre- and post-treatment TKS scores in the RFT group, but not in the CPT group. There was no significant difference between the groups in any of the pre-treatment scores. There was also no significant difference between the groups in the post-treatment scores, except for the TKS scores.

Conclusion: The study findings indicated that MNRFT and median nerve blockade reduced kinesiophobia more than CPT.

Keywords: radiofrequency, kinesiophobia, physical therapy, facet joint, pain, depression, oswestry

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INTRODUCTION

Lumbar facet syndrome (LFS), which is likely to stem from the degenerative and traumatic disorders of the facet joint, presents with local and/or leg pain in the lower back. It has been speculated that in 15% of cases of chronic low back pain, the pain originates from the facet joint (1). LFS is characterized by regional pain radiating to the paravertebral region of the lower back and hip. The pain increases with prolonged sitting and standing, especially with the extension movement. Sensitivity emerges with pressure on the facet joint. There is no nerve dysfunction, hence the degenerative changes in the facets can be visualized with imaging methods (2). In the treatment of LFS, analgesics such as transcutaneous electrical nerve stimulation (TENS), physiotherapy applications such as superficial and deep heating modalities are beneficial in terms of minimizing the load on facets and discs and eliminating pain and muscle spasms. Patients with LFS may be taught proper waist posture that they can use especially during working and may be encouraged to perform regular exercises such as walking, swimming, and cycling as part of daily life activities. In cases where other treatment methods are not successful, facet denervation with radiofrequency thermocoagulation can be resorted (3). Pain can cause behavioral, cognitive, and physical fear responses. It is accepted that pain-related fear is the result of catastrophic thoughts and negative interpretations that pain is equivalent to the harmful sensory effect (4). The prevalence of kinesiophobia in conditions featuring chronic pain varies between 50 and 70% (5,6).

In light of the foregoing, the objective of this study is to investigate the effects of CPT and MNRFT on kinesiophobia in patients with LFS and to determine the early effects of CPT and MNRFT on depression and sleep quality.

MATERIAL AND METHOD

The population of this study consisted of patients over 18 who were diagnosed with LFS at the Hatay Training and Research Hospital Algology Outpatient Clinic. Written informed consent was obtained from each patient included in the study. The study protocol was approved by the Hatay Mustafa Kemal University Clinical Research Ethics Committee before the study was conducted (04/10/2021-26). The study was carried out in accordance with the principles set forth in the Declaration of Helsinki. Anamnesis of the patients who applied to the outpatient clinic was taken, and their physical examinations were performed. In the physical examination, the waist and lower extremity joint range of motion of the patients was evaluated, quadriceps muscle strength was checked, straight leg raise (SLR) test was performed, deep tendon reflexes (DTR) and pathological reflexes such as Babinski sign were evaluated. Sacroiliac and hip joint examinations were performed on all patients. Patients with suspected facet syndrome were included in the study, whereas those with coagulation disorders, pregnancy, mental disorders, malignancy, psychiatric disorders, sacroiliac, and hip joint pathologies, a history of back surgery, a history of the radiofrequency procedure, advanced (grade 3-4) spondylolisthesis defect in the lumbar vertebrae, spinal canal stenosis shown by magnetic resonance imaging (MRI), clinical findings consistent with radiculopathy with a significant spread of pain below the knee, a history of systemic inflammatory disease, advanced cardiac failure, pulmonary disease, and those treated with a physical therapy agent from the waist region in the past year were excluded from the study. Patients' bilateral lumbar radiographs and lumbar MRI scans taken within the past year were evaluated if available. Necessary examinations were requested for patients who did not have imaging examinations. Sixty patients included in the sample were divided into the CPT and MNRFT groups of 30 patients each according to the treatment they received. The patients in the MNRFT group were administered at least two levels of MNRFT according to the localization of pain followed by median nerve blockade. The patients in the CPT group were administered TENS and subjected to superficial heating with hot packs and deep heating with ultrasonography (USG). After the completion of the treatments, patients in both groups were given a home exercise program. The patients were evaluated before the treatment and at the 1st-month follow-up after the treatment. Demographic and clinical characteristics, including age, gender, height, weight, and body mass index (BMI, kg/m^2) of the patients in both groups were recorded. The patients in both groups

were evaluated for pain severity, kinesiophobia, sleep quality, functional status, and depression both before the treatment and one month after the treatment using the Visual Analogue Scale (VAS), Tampa Scale for Kinesiophobia (TKS), Pittsburgh Sleep Quality Index (PSQI), Oswestry Disability Index (ODI) and Beck's Depression Inventory (BDI), respectively. TKS, which was used to assess kinesiophobia, is a 17-item scale that assesses acute and chronic low back pain, fibromyalgia and musculoskeletal injuries and whiplash-related health problems. The Turkish version of the TKS, the reliability studies of which was completed, was used (7). The ODI is a 10-item questionnaire that assesses the functional status of low back pain (8). The BDI is a 21-item questionnaire that assesses the characteristic attitudes and symptoms of depression. The total BDI scores of 10 and above indicate depression (9).

Statistical analysis

The statistical analyses of the collected data were carried out using SPSS 21.0 (Statistical Product and Service Solutions for Windows, Version 21.0, IBM Corp., Armonk, NY, U.S., 2012) software package. The descriptive statistics obtained from the collected data were expressed as mean and standard deviation, minimum-maximum, frequency, and percentage values. The normal distribution characteristics of the continuous variables were analyzed using the Shapiro-Wilk test. Comparisons between the groups based on the normal distribution characteristics of the variables were carried out using Student's t-test and paired samples t-test. A p-value < 0.05 was considered statistically significant.

RESULTS

The distribution of sociodemographic and clinical characteristics of the 60 patients included in the is shown in Table 1 study by the treatment groups. The mean age of the MNRFT group was significantly higher than that of the CPT group ($p<0.05$). There was a significant difference between the pre- and post-treatment VAS, PSQI, ODI, BDE, and TKS scores in the MNRFT group ($p<0.001$) (Table 2). Similarly, there was a significant difference between the pre- and post-treatment VAS, PSQI, ODI, and BDE scores in the CPT group ($p<0.05$) (Table 3). On the other hand, there was no significant difference between the pre- and post-treatment TKS scores in the CPT group ($p = 0.348$) (Table 3). There was no significant difference between the treatment groups in the mean pre-treatment VAS, PSQI, ODI, BDE, and TKS scores ($p>0.05$) (Table 4). Similarly, there was no significant difference between the treatment groups in the mean post-treatment VAS, PSQI, ODI, and BDE scores ($p>0.05$) (Table 5). On the other hand, there was a significant difference between the treatment groups in the mean post-treatment TKS scores ($p=0.025$) (Table 5).

DISCUSSION

The findings of this study revealed a significant difference between the mean pre- and post-treatment TKS scores in the MNRFT group but not in the CPT group, and between the groups in the mean post-treatment TKS scores, but not in the mean pre-treatment TKS scores. In comparison, a meta-analysis of 122 studies, including 11 randomized and 13 observational studies, on the efficacy of injection or RF applications to the facet and its associated structures concluded that RF neurotomy and facet and medial branch blocks had good and moderate to good efficacy, respectively, in reducing lumbar facet pain, respectively, whereas that the intra-articular lumbar facet joint injection had limited efficacy (10). In a systematic review by Datta et al., it was determined that the evidentiary value of median nerve block (MNB) for facet syndrome

Table 1. Distribution of sociodemogprahic and clinical characteristics by the treatment groups.

Variables	MNRFT Group	CPT Group	*p* value
Age (year)	53.67±8.027	48.87±5.64	0.02
Length (cm)	163.6±11.270	166.83±9.30	0.194
BMI (kg/m^2)	29.19±3.97	25.52±3.31	0.043

Abbreviations: MNRFT: Median Nerve Radiofrequency Therapy, CPT: Conventional Physiotherapy

*chi-squared test (likelihood ratio for multi-span setups with few data)

Table 2. The comparison of mean pre- and post-treatment scale scores in the MNRFT group.

Assessment Tools	pre- or post-treatment	Mean ± SD	Min - Max	*p* value
VAS	pre-treatment	7.36 ± 1.62	4 - 10	**0,001**
	post-treatment	3.50 ±1.25	2 - 6	
ODI	pre-treatment	46.63 ±19.68	22 - 96	**0.001**
	post-treatment	27.46 ± 20.44	6 - 84	
TKS	pre-treatment	45.86 ± 7.48	34- 67	**0.001**
	post-treatment	39.83 ± 8.21	24 - 53	
PSQI	pre-treatment	6.033 ± 5.22	2 - 19	**0.001**
	post-treatment	4.96 ± 3.56	2 - 15	
BDI	pre-treatment	20.3± 3.14	4-34	**0.001**
	post-treatment	13.14±5.12	0-25	

Abbreviations: MNRFT: Median Nerve Radiofrequency Therapy, VAS: Visuel Analog Scale, ODI: Oswestry Disability Index, TKS: Tampa Kinesiophobia Scale. PSQI: Pittsburgh Sleep Quality Index, BDI: Beck's Depression Inventory

Table 3. The comparison of mean pre- and post-treatment scale scores in the CPT group

Assessment Tools	pre- or post-treatment	Mean ± SD	Min - Max	*p* value
VAS	pre-treatment	6.66 ± 1.74	4 - 10	**0,001**
	post-treatment	3.26 ±1.96	1 - 7	
ODI	pre-treatment	43.46 ±19.32	10 - 82	**0.001**
	post-treatment	29 ± 15.3	2- 58	
TKS	pre-treatment	44.43 ± 4.18	35- 51	0.348
	post-treatment	43.73 ± 4.20	36 - 53	
PSQI	pre-treatment	5.9 ± 3.79	1 - 15	**0.001**
	post-treatment	3.36 ± 2.29	1- 10	
BDI	pre-treatment	18,6± 4.21	0-41	**0.001**
	post-treatment	12.3±3.22	0-34	

Abbreviations: CPT: Conventional Physiotherapy, VAS: Visuel Analog Scale, ODI: Oswestry Disability Index, TKS: Tampa Kinesiophobia Scale. PSQI: Pittsburgh Sleep Quality Index, BDI: Beck's Depression Inventory

Table 4. The comparison of mean pre-treatment scale scores between the treatment groups.

Assessment Tools	MNRFT Group		CPT Group		*p* value
	Mean ± SD	Min - Max	Mean ± SD	Min - Max	
VAS	7.36 ± 1.62	4 - 10	6.66 ± 1.74	4 - 10	0.114
ODI	46.63 ±19.68	22 - 96	43.46 ±19.32	10 - 82	0.532
TKS	45.86 ± 7.48	34- 67	44.43 ± 4.18	35- 51	0.384
PSQI	6.033 ± 5.22	2 - 19	5.9 ± 3.79	1 - 15	0.076
BDI	20,3± 3.14	4-34	18,6± 4.21	0-41	0.081

Abbreviations: MNRFT: Median Nerve Radiofrequency Therapy, CPT: Conventional Physiotherapy, VAS: Visuel Analog Scale, ODI: Oswestry Disability Index, TKS: Tampa Kinesiophobia Scale. PSQI: Pittsburgh Sleep Quality Index, BDI: Beck's Depression Inventory

Table 5. The comparison of mean post-treatment scale scores between the treatment groups.

Assessment Tools	MNRFT Group		CPT Group		*p* value
	Mean ± SD	Min - Max	Mean ± SD	Min - Max	
VAS	3.50 ±1.25	2 - 6	3.26 ±1.96	1 - 7	0.586
ODI	27.46 ± 20.44	6 - 84	29 ± 15.3	2- 58	0.743
TKS	39.83 ± 8.21	24-53	43.73 ± 4.20	36 - 53	**0.025**
PSQI	4.96 ± 3.56	2 - 15	3.36 ± 2.29	1- 10	0.059
BDI	13.14±5.12	0-25	12.3±3.22	0-34	0.449

Abbreviations: MNRFT: Median Nerve Radiofrequency Therapy, CPT: Conventional Physiotherapy, VAS: Visuel Analog Scale, ODI: Oswestry Disability Index, TKS: Tampa Kinesiophobia Scale. PSQI: Pittsburgh Sleep Quality Index, BDI: Beck's Depression Inventory

was between 1 and 2, and the evidentiary value of MNB and MNRFT, which were found to be effective in the treatment group, was 2. On the other hand, the efficacy of intra-articular injections was limited (11). Numerous studies have been conducted on the efficacy of physiotherapy in chronic low back pain (12-16). In one of these studies, in which superficial and deep heating agents were utilized along with TENS, Kulaber et al. measured the pain levels with VAS and determined that physiotherapy significantly reduced the pain (12). Şahin et al. randomized the patients with chronic low back pain into two groups. They administered physical therapy modalities, initiated a physical exercise program, and prescribed medical treatments to the first group, while only initiated a physical exercise program and prescribed medical treatments to the second group without administering physical therapy modalities (16). VAS and ODI scales were used to assess pain and functionality in order to determine the efficacies of the treatments applied to both groups. Consequently, they detected a significant reduction in the VAS and ODI scores in both groups, indicating a significant improvement in pain and functionality. However, the reduction in the VAS and ODI scores was more pronounced in the first group, which also received physical therapy modalities, than in the second group (16). In line with the literature, there was a significant reduction in the VAS and ODI scores in both the MNRFT and CPT groups included in this study. Accordingly, the mean pre-treatment ODI score, which was 43.26 in the CPT group with chronic low back pain substantially limiting daily life activities, decreased to 29 after the treatment, reflecting the reduction in pain and the improvement in functionality. Similarly, the efficacy of RFT on VAS and ODI scores has been shown in many studies (17-19). In parallel, there was a significant difference between the mean pre- and post-treatment VAS and ODI scores in the MNRFT group. Accordingly, the mean pre-treatment ODI score, which was 46.63 in the MNRFT group with chronic low back pain substantially limiting daily life activities, decreased to 27.46 after the treatment, reflecting the reduction in pain and the improvement in functionality. Various studies have reported higher PSQI total scores in individuals with chronic pain than in individuals without chronic pain and a moderate positive correlation between PSQI and VAS scores (20-23). Sleep disorders due to chronic pain can cause stress in daily life, difficulties in performing simple tasks, and memory impairment, all of which have a negative impact on quality of life (24). In line with the literature data, the analysis of the mean pre-treatment PSQI scores of the CPT and MNRFT groups (5.9 ± 3.79 and 6.033 ± 5.22, respectively) indicated that the sleep quality was insufficient in both groups. However, the significant difference observed between the mean pre- and post-treatment PSQI scores in both groups indicated that both treatments, i.e., CPT and MNRFT, positively affected sleep quality. There are studies investigating the factors affecting chronic low back pain and how patients' beliefs and behaviors are changed by the pain. The clinical studies conducted in this context have demonstrated that the fear of re-injury and movement due to pain, that is, "kinesiophobia", is very important in patients with chronic low back pain (25). Avoidance behavior makes sense in the acute period, as it can prevent further injury to the person. On the other hand, kinesiophobia, which is a reflection of avoidance behavior in the chronic period, leads to a vicious cycle of deterioration in daily activities,

disability, and mental problems, resulting in further pain (26). As in this study, studies available in the literature have shown that patients with chronic low back pain typically have high kinesiophobia scores (27-29). In a study of 80 patients, CPT resulted in a significant reduction in the TKS scores compared to the mean pre-treatment scores (30). In parallel, a significant reduction in TKS scores was observed in 265 patients with chronic neck, back and low back pain after the administration of a multidisciplinary rehabilitation program. In contrast, there was no significant difference between the mean pre- and post-treatment TKS scores of the patients who were administered CPT. The absence of a significant change in the mean TKS scores, despite the decrease observed in the mean VAS and BDI scores in the CPT group at the first month of follow-up, might be attributed to the lack of an accompanying physical exercise program, the gradual emergence of the benefits of CPT, and the gradual decrease in patients' pain. These findings indicated that the patients' fear of injury has persisted. Accordingly, it can be concluded that CPT alone does not have a sufficient effect on kinesiophobia. Thus, administration of CPT in combination with physical exercise programs may have a more pronounced effect on kinesiophobia. Unlike the CPT group, there was a significant difference between the mean pre- and post-treatment TKS scores in the MNRFT, which might be attributed to the rapid decrease in pain with MNRFT and MNB, thereby resulting in a decrease in negative thoughts originating from pain. With the decrease in the pain, the patient can overcome the fear of movement, and thus the paravertebral muscles can be strengthened more rapidly and pain relief can be achieved more easily. It has been stated that the strength of the lumbar paraspinal muscle decreases in patients with low back pain (31). Therefore, the strengthening of the muscles supporting the vertebral column will likely reduce the pain in these patients. Consequently, patients who spend the resting period without pain will be able to more easily break the vicious circle that inflicts continuous pain, mobilize earlier, and increase their exercise capacity.

The rapid reduction of pain in patients with high TKS scores indicates that patients can adapt quickly to physical exercise. In addition, there are studies suggesting that stress therapy as well as somatization therapy should be added to the treatment of chronic low back pain (32,33). As a matter of fact, a study of 100 patients reported a relationship between chronic low back pain originating from the facet joint and psychological factors such as general anxiety, somatization, and depression (34). General anxiety may cause a decrease in lumbar paraspinal muscle strength and an increase in pain in the long term, in parallel with an increase in kinesiophobia. The reduction in pain levels in the short term due to MNRFT treatment suggests that MNRFT treatment may also reduce anxiety in patients and their relatives. The reduction in stress for the patient's relatives may in turn contribute to a reduction in additional stress for the patient. All in all, it is likely that the reduction in pain levels in a short time as a result of MNRFT will contribute to the reduction in kinesiophobia.

The primary limitation of the study was its relatively small sample size. Secondly, considering that long-term follow-up data would have provided a broader perspective, the fact that the follow-up period was only one month may be considered another limitation of the study.

In conclusion, the study findings revealed that both CPT and MNRFT reduced the pain, depression levels, and ODI scores, and improved sleep quality in patients with chronic low back pain in the early period. However, there is a need for controlled studies with larger series to determine how long the positive effects of these treatments last. CPT did not have any significant positive effect on kinesiophobia, suggesting that a physical exercise program should be implemented alongside CPT to achieve the desired positive effect on kinesiophobia. In contrast to CPT, MNRFT significantly decreased kinesiophobia scores. The reduction in pain levels achieved in a short time with MNRFT translated into significantly lower kinesiophobia scores. The reduction in pain in a short time in patients with high TKS scores will likely increase patients' compliance with physical exercise.

Ethical approval

This study has been approved by the Mustafa Kemal University Non-invasive Clinical Research Ethics Committee (approval date 04.10.2021, number 26). Written informed consent was obtained from the participants.

Author contribution

Surgical and Medical Practices: FE; Concept: FE, FÇE; Design: FE, FÇE; Data Collection or Processing: FE, FÇE; Analysis or Interpretation: FE, FÇE; Literature Search:FE, FÇE; Writing: FE, FÇE. All authors reviewed the results and approved the final version of the article.

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Conflict of interest

The authors declare that there is no conflict of interest.

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