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Original Article

Lomber facet injections are equally effective for treatment of facet joint-induced low back painin the obese compared to non-obese population: a single center retrospective study

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Abstract: Lomber facet injection (LFI) is a non-surgical method of treatment used for pain in the waist and neck regions associated with facet joint calcification inflammation and trauma. In obese patients, practitioners may be reluctant to make an attempt. The reason for this is the technical difficulty of LFI in individuals with their larger body mass. Until now, none of the studies has compared the efficiency of the LFI with the body mass index (BMI). In our study, the aim was to evaluate the relationship with BMI in normal weight, overweight and obese patients with low back pain during the apply of LFI. This retrospective cohort study was performed in Diyarbakır Selahaddini Eyyubi State Hospital pain clinic between January 2017 and December 2017. It included approximately 60 patients (32 males and 28 females) who had back pain for at least 3 months and who were applied lumbar facet injection (LFI) with ultrasonography (USG) due to lumbar facet syndrome (LFS). All injections were made by the USG. Patients were divided into 3 groups as normal weight (18.5 kg/m^2 < BMI < 25 kg/m^2) (control group), overweight (25 kg/m^2 < BMI < 30 kg/m^2) and obese (BMI > 30 kg/m^2). 30 patients were overweight, 15 patients were overweight and 15 patients were obese. The age, gender, duration of complaints, number of facet joints performed and the complications observed with interventional procedures were recorded in all three groups. In addition, visual analogue scores (VAS) and Modifiye Oswestry Disability Index (MODI) values recorded at pre-injection and 1st day, 1st, 3rd, 6th months after injection were compared in all groups. In all 3 groups, VAS and MODI scores recorded at pre-injection, 1st day and 1st, 3rd, 6th months after injection were lower in all recurrent measurements compared to baseline values (P < 0.05). When the demographic data of the patients were compared, it was determined that the ages of patients (46.8 ± 16.5 year) were older in group 2 (P = 0.83) but not statistically meaningful (P = 0.83), and the female/male ratio (10/5) was higher in group 2 and that wasn't meaningful compared with other groups (P = 0.51), and although the number of patients with chronic pain (lasts for more than 6 months) was higher in all 3 groups 0.64), this score (11.2 ± 3.64 ay) was higher in group 3 but not statistically meaningful (P = 0.64). We believe that not only LFI is an effective treatment method for overweight and obese patients like normal weight patients, but also it improves the quality of life of patients.

Keywords: Low back pain, ultrosonography, lomber facet injection, obesity

Introduction

Low back pain is the most common musculoskeletal disease in the adult population and the most significant reason of which is disc herniation. In addition, many studies have revealed that 14-18% of chronic low back pain is caused by facet joint-derived pathologies [1]. Firstly, in the early 19th century, facet joints may cause waist and neck pain [2]. Medial branch block is an effective treatment option in the treatment of pain caused by facet joints. Although this method of interventional treatment has emerged long years ago, it has become a routine practice in a lot of centers and even a daily applied procedure due to the rapid acceleration of minimally invasive techniques in recent years.

In the early years of facet joint blockage, while the anatomic region to be applied by palpation is targeted, facet joint injections are practically performed by accompanied with fluoroscopy or rarely by computerized tomography (CT) due to the increase and widespread of radiological imaging diversity in the following years [3]. Targeting the correct anatomic location is the most important factor to affect the outcome of treatment to be done. For this reason, it is very important to make an attempt by imaging. However, especially carcinogenic and teratogenic side effects of imaging tools used in routine are inevitable. These undesirable radioactive rays affect not only the patients but also the healthcare workers who perform the operation and who are at the same place during the application. For this reason, the popularity of interventional procedures using ultrasound devices that do not cause radioactive ray exposure is increasing day by day, and it is becoming important that both patient and health care workers are minimally exposed to these harmful rays [4, 5].

Becoming overweight and obesity are the factors that increase the risk of back pain. Excessive overloading of the vertebrae, systemic inflammation and lumbar facet degeneration may be mentioned by an apparatus. In the treatment of low back pain, conservative treatment methods (lying, medical treatment, physical therapy) should be applied to both obese and non-obese patients and treatment should be planned for the underlying cause. Conservative methods are particularly important in obese patients. If these treatments fail, the risk of peroerative complications will increase as body mass index (BMI) increases. This is why steroid injection, which is a minimally invasive procedure, is used as an outpatient treatment method for lumbosacral radicular pain [6].

Material and methods

Objectives

In this study, we aimed to compare the connection of applicability, effectiveness and complication rates of the technique in patients whom we applied facet intraarticular injection under ultrasound guidance with body mass index.

Study design

This clinical trial research was carried out at Diyarbakır Selahaddini Eyyübi State Hospital, Diyarbakır/Turkey, between January and December in 2017. The written approval was taken from each participant.

Sample size

Before the start of the study, we applied power analysis to calculate the required sample size to achieve 80% statistical power with a confidence interval of 95% and 5% level of significance. Results showed that 50 patients would be sufficient to reach the goal. Considering the possible exclusions and problems that might decrease the power of the study, we decided to recruit at least 60 patients (20% higher than the initial sample size) in the research.

Sample collection and participants

After the plan of the study, patients with a range of ages of 18-65 years who applied to the pain clinic with complaints of low back and leg pain between January-December in 2017 and the alternatives of treatment applied to these patients were studied retrospectively.

As a criteria of exclusion, patients with positive leg stretch test on physical examination, patients with loss of muscle strength in coexisting lower extremity with lumbar spine, and patient facet intraarticular injection technique requiring surgical treatment after lomber magnetic resonance imaging were excluded and these patients were excluded from the study. In addition, patients with known coagulation disorders who were pregnant or pregnancy-suspected, younger than 18 years, with local or systemic infectious disease, steroid or local anesthesia allergy, and those with previous history of lumbar spinal surgery or intervention were excluded. Patients with Lomber spine facet joint pain and palpation-associated facet joint-level pain were included in the study.

In the cases included in the study, patients were divided into 3 groups: patients who have normal Body Mass Index (BMI = kg/m^2) values; group 1 (18.5 kg/m^2 < BMI < 25 kg/m^2), overweight patients; group 2 (25 kg/m^2 < BMI < 30 kg/m^2) and obese patients; group 3 (BMI > 30 kg/m^2). Of the patients, 30 were overweight,

15 were owerweight and 15 were obese. Age, gender, duration of complaints, number of facet joints performed and intervention times and postoperative complications were recorded in all three groups. In addition, VAS and MODI values recorded at pre-injection and 1st day, 1st, 3rd, 6th months after injection were compared.

In the VAS analysis, the patients were explained what the figures mean on a 10 cm horizontal VAS. 0 means no pain, 10 means the most severe pain encountered in life, and 5 means moderate pain. The patients were asked to describe the severity of the pain and the values indicated by the patients were taken into account.

In the MODI scale, a total of 10 questionnaires questioning the level of pain and the degree of change, the reasons for pain and the changes in the activities of daily life were asked and the recorded values were examined. All information was recorded by the pain specialist who performed the procedure.

In order to achieve an effective outcome among the groups, the analgesic medicines used currently in all patients were stopped 12 hours ago before the interventions. Of the patients who were scheduled in the follow-up period throughout 6 months after intra-articular injection, analgesics/myorelaxan users in the follow-up period were excluded from the study. All attempts were made by the expert under strictly sterile conditions. The same agents were administered at the same doses in the injections applied to the patients in all three groups. One-session intervention was applied to patients included in the study (**Figure 1**).

Facet joint injection with ultrasound guidance

Patients were placed in prone position. In order to obtain posterior paravertebral parasagittal images, ultrasonic probe (Sonosite® M-Turbo Bothell WA, USA) (HFL 38X/13-6 MHz Transducer, Bothell WA, USA) was held paralel to the axis of the vertebrea and facet joints planned intervention were detected (**Figure 2A**). Then, the ultrasonic probe was held parallel to the horizontal axis and the spinal needle was directed to the target facet joint space in real-time imaging association (**Figure 2B**). Firstly, bone contact was provided, then 6 mg betamethasone total of 2 cc in every facet joint space (Celesto chrono-dose®, Schering AG, Berlin, Germany) and 1% lidocaine hydrochloride (Jetmonal® bulbs, Adeka Pharmaceuticals, Istanbul/Turkey) were injected.

Statistical analysis

All statistical analyzes of the data obtained in our study were performed with SPSS 16.0 (Statistical Package for Social Sciences, Software Inc., Released in 2009, Chicago, USA). The results were given as mean and standard deviation and percentage. Patients were divided into 3 groups as normal weight (18.5 kg/m^2 < BMI < 25 kg/m^2) (control group), overweight (25 kg/m^2 < BMI < 30 kg/m^2) and obese (BMI > 30 kg/m^2). Significant differences were measured by using the normal weight group as control group. Independent sample t test was used for evaluation of demographic data and obesity. One-way ANOVA/Post Hoc Tukey test was used in evaluating VAS and MODI. The confidence interval of the results was 95%. A value of < 0.05 was considered statistically significant.

Ethics, consent and permissions

This study was reviewed and approved by the institutional review board at the Diyarbakir Gazi Yasargil Training and Education Hospital, Turkey (no. 2017/98, Chairperson Professor Mehmet Nuri Ozbek). Written informed consent was otained from all patients.

Results

Demographic characteristics of normal weight, overweight and obese groups

In our study, 30 patients were group 1 (mean age 45.8 ± 14.7, 16 female and 14 male), 15 patients were group 2 (mean age 46.8 ± 16.5, 10 female and 5 male) (mean age 46.2 ± 11.9 years, 7 female and 8 male), total of 60 patients underwent facet joint injection. The mean BMI was 23.24 ± 2.53 in group 1, 27.25 ± 1.68 in group 2, 30.23 ± 5.68 in group 3, and the difference was statistically significant (P = 0.0001). Mean duration was 10.6 ± 4.27 months and the difference between the groups was not statistically significant (P > 0.05).

The mean number of facet joints injected was 3.4 ± 1.1 in group 1 and the difference between the groups was not statistically significant (P >

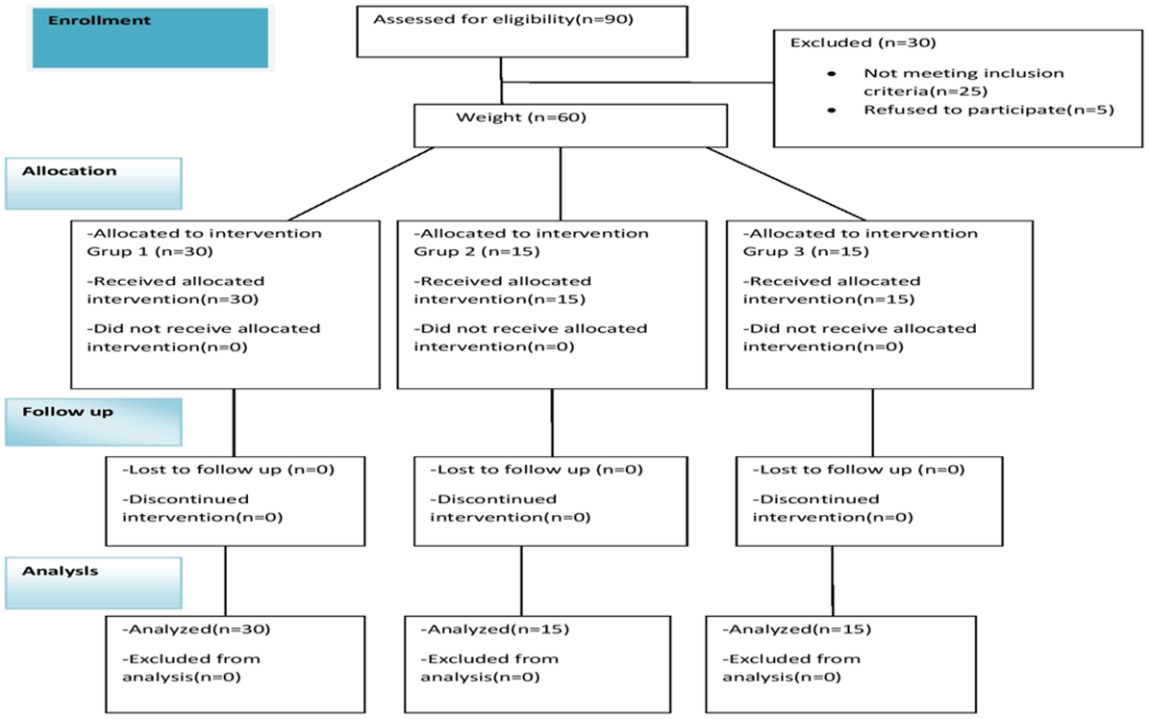

Figure 1. Consort diagram [group 1 = control group (18.5 kg/m^2 < BMI < 25 kg/m^2); group 2 = overweight (25 kg/m^2 < BMI < 30 kg/m^2); group 3 = obese (BMI > 30 kg/m^2), Ultrasonograpy guided facet joint steroid enjection].

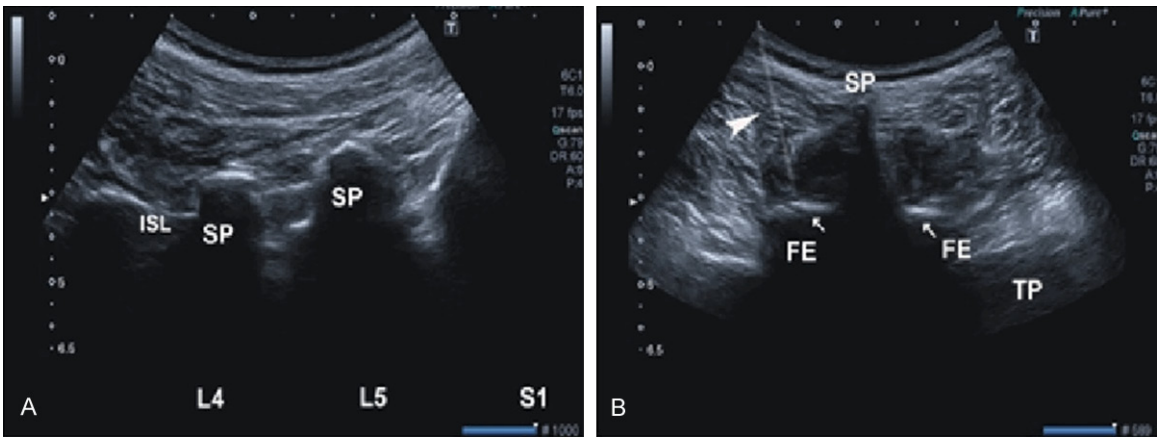

Figure 2. Images of a patient to whom we applied facet joint injection under ultrasound guidance during procedure. (A) Image obtained by holding the probe parallel to the parasagittal axis for level detection (B) Orientation of the targeted right facet insertion spinal needle and hyperechogenic appearance due to the metal (arrowhead).

0.05). The injection duration was 3.7 ± 0.7 in group 1 and there was no statistically significant difference between group 2 (4.33 ± 1.7) (P = 0.08) but significant in group 3 (4.66 ± 1.49). There was a statistically significant difference between the two groups (P = 0.005) (**Table 1**).

The distribution of VAS and MODI values

There was a significant decrease in VAS and MODI values recorded at different periods before and after injection in all three groups P < 0.05. Although the clinical results of USG-guided intra-articular injections were different between the groups, the results were not statistically significant (P > 0.05) (**Table 2**).

The rates of complication

When the complications observed among the groups were examined, no major complication was found in the patients. At group 1, hypo-

Table 1. Demographic characteristics of normal weight (18.5 kg/m^2 < BMI < 25 kg/m^2), overweight (25 kg/m^2 < BMI < 30 kg/m^2), and obese (BMI > 30 kg/m^2) groups (mean ± standard deviation and *P* value with respect to normal weight)

	Normal weight n: 30	Over weight n: 15	Obese n: 15
Age[a], y	45.8 ± 14.7	46.8 ± 16.5 *P* = 0.83	46.2 ± 11.9 *P* = 0.91
Gender[b]			
Female	16 (53.3%)	10 (66.6%)	7 (46.6%)
Male	14 (46.7%)	5 (33.4%) *P* = 0.51	8 (53.4%) *P* = 0.44
Height[a], cm	170 ± 8.65	169 ± 10.52 *P* = 0.32	163 ± 8.77 *P* = 0.28
Weight[a], kg	66.9 ± 15.22	78.8 ± 14.26 *P* = 0.000*	84.6 ± 14.49 *P* = 0.000*
BMI[a,c], kg/m^2	23.24 ± 2.53	27.25 ± 1.68 *P* = 0.000*	30.23 ± 5.68 *P* = 0.000*
The span of injection[a], min	3.7 ± 0.7	4.33 ± 1.7 P = 0.08	4.66 ± 1.49 P = 0.005
The number of facet joints performed injected[a]	3.4 ± 1.1	3.6 ± 1.4 P = 0.60	3.93 ± 1.27 P = 0.15
The span of complaint[a], m	10.6 ± 4.27	10.06 ± 3.28 P = 0.67	11.2 ± 3.64 P = 0.64

Abbreviations: y, year; cm, centimeters; Kg, kilograms; m^2, square-meter; min, minute; m, month; SD, Standard Deviation; *, indicates statistical significance. [a]Data presented as mean ± SD. [b]Data presented as No.(%). [c]Body mass index. Independent sample t test was used for evaluation of demographic data and obesity A value of < 0.05 was considered statistically significant.

tension was observed in 5 patients, headache in 2 patients, nausea-vomiting in 3 patients. At group 2, hypotension was observed in 2 patients, headache in 2 patients, nausea-vomiting in 1 patient. At group 3, minor complications were observed such as hypotension in 3 patients, headache in 1 patient, nausea-vomiting in 1 patient, urinary incontinence in 1 patient (**Table 3**).

Discussion

In this study, we evaluated the efficiency of body mass index and treatment responses by appling a mixture of 6 mg betamethasone and 1% lidocaine hydrochloride, with total 2 ml for normal weight (group 1), overweight (group 2) and obese patients (group 3) who appealed to our hospital with a lomber facet pain that could not be treated with conservative and medical treatment, in the facet joint. As a result, VAS and MODI values recorded before and after injection were significantly decreased in all three groups in which 60 LFI patients were treated (P < 0.05).

Low back pain is one of the most common musculoskeletal problems in adults. Although the most common cause of pain in the lomber spine is considered to be disc, facet syndrome has been estimated to be responsible for 15-40% of chronic back pain, depending on the population studied [1, 7]. In studies investigating the prevalence of facet syndrome, this rate ranges from 5% to 90%.

The innervation of the facet joints provides the fibers of the medial branch of the posterior primer ramus and the dorsal branch of the sinusoidal nerve. Out of these nerves, the medial branches are the main branches being responsible for the pain, and the medial branches form the afferent and efferent branches by separated two branches after the distance they have existed. Thus, the pain identified by palpation is not only due to the medial limb of that level, but also to the medial branch from the upper limb. Because of this anatomical structure, all of our patients were injected with at least two levels of facet joints. For example, a patient with right L4-L5 facet joint tenderness was injected into both right L4-L5 and right L3-L4 facet joints.

The most commonly used medications for facet joint injection are local anesthetic (LA) or non-local anesthetic corticosteroids. While most experts believe that the administration of lomber facet joint corticosteroid injection is to treat inflammation caused by osteoarthritis [8], it is to alleviate temporarily visible local anesthetic symptoms. However, the exact mechanism of action of intra-articular LA/corticosteroid injection is not known. Also, the results of interventional intra-articular LA/corticosteroid injection in the treatment of lomber facet joint syndrome should be discussed.

In a review by Bogduk, has showed that the effectiveness of the lomber intrarticulary corticosteroid injection for lumbar pain is not better

Table 2. The distribution of VAS and MODI values in patient groups distinguished by their characteristics

	Normal weight n: 30	Over weight n: 15	Obese n: 15
VAS[a]			
Preinjection	8.16 ± 0.83	8.13 ± 0.74 *P* = 0.99	8.40 ± 0.73 *P* = 0.62
After injection 1 day	2.86 ± 1.43	2.73 ± 1.98 *P* = 0.96	3.13 ± 1.92 P = 0.87
After injection 1 month	3.23 ± 1.69	2.86 ± 2.23 *P* = 0.81	3.46-1.99 *P* = 0.92
After injection 3 months	3.70 ± 1.78	3.20 ± 2.11 *P* = 0.69	3.66-2.12 *P* = 0.99
After injection 6 months	3.86 ± 1.52	4.53 ± 1.50 *P* = 0.35	4.13-1.55 *P* = 0.84
MODI[a]			
Preinjection	26.2 ± 10.1	24.8 ± 10.2 *P* = 0.97	25.6 ± 9.9 *P* = 0.95
After injection 1 day	12.8 ± 10.5	12.9 ± 10.3 *P* = 0.82	13.1 ± 10.1 *P* = 0.89
After injection 1 month	12.3 ± 10.1	12.1 ± 10.2 *P* = 0.83	12.6 ± 10.3 *P* = 0.93
After injection 3 months	12.7 ± 12.2	12.3 ± 11.9 *P* = 0.81	12.7 ± 12.1 *P* = 0.97
After injection 6 months	15.1 ± 13.1	14.9 ± 12.8 *P* = 0.74	15.3 ± 13.2 *P* = 0.85

Abbreviations: VAS, Visual analogue scores; MODI, Modifiye Oswestry Dizabilite İndeksi; SD, Standard Deviation. [a]Data presented as mean ± SD. One-way ANOVA/Post Hoc Tukey test was used in evaluating VAS and MODI. A value of < 0.05 was considered statistically significant.

Table 3. The rates of complication

Complications	Normal weight n: 30	Over weight n: 15	Obese n: 15
Hypotension	5 (16.6%)	2 (13.3%)	3 (20%)
Headache	2 (6.6%)	2 (13.3%)	1 (6.6%)
Nause-Vomiting	3 (10%)	1 (6.6%)	1 (6.6%)
Urinary Incontinence	0	0	1 (6.6%)
Total	30	15	15

than placebo injection [9]. However, Carette et al. [10] reported significant pain relief and functional improvement in patients undergoing corticosteroid injection for 6 months. Besides, Ribeiro et al. [11] reported mild pain relief and functional improvement after 24 weeks of intra-articular corticosteroid injection Interestingly, the lowest VAS score (4.7) appeared 1 week and 4 weeks after treatment, while the VAS pain score was 5.3 after 24 weeks. Pneumaticos et al. [12] showed that 87% of patients with facet joint anomalies had an improvement in pain score at 1 month after corticosteroid and local anesthetic injections, but only 53% of patients achieved the same result after 6 months. These results suggest that the short-term effects of corticosteroid injection without local anesthetic or local anesthetic are better than long-term effects. In a few systematic studies, researchers have concluded that intra-articular corticosteroid injection may be a short-term pain relief and functional recovery effect to treat lumber facet joint pain, but the evidence of long-term pain relief is limited [13, 14]. According to the changes above in LA/corticosteroid treatment, our results of LA/corticosteroid injections showed that the average VAS scores at rest were 8.2, 2.9, 3.2, 3.5, 4.1. Before and after LFE application, at first, third, and sixth months.

Although facet joint pain is the primary cause of low back pain, it is difficult to diagnose because of localization diversity, other causes of back pain and not being isolated. By physical examination, there is no clear maneuver to distinguish pain caused by facet joints from other causes of pain. Among the diseases that can cause lumbar pain, symptoms and physical examination findings are related to each other. The absence of a fully accepted standard for diagnosis makes it difficult. Lumbar facet pain may be acute, subacute or chronic, usually starts insidiously. Low back pain is usually unilateral and it may spread behind the scrotum, the large trochanteric and the thigh. Lumbar pain without radicular extension and absence of pain under the knee is characteristic for facet joint pain. The pain of the L4-L5 and L5-S1 facet joints can rarely spread to the lateral and even to the foot. However, in these patients, back pain is usually more severe than

leg pain. The pain increases with standing, rotation, lumbar extension and lateral flexion to the point it occurs. In facet joint pathologies, especially rotation movements are painful. It is reduced by sitting and lumbar flexion. In addition, old age, previous lumbar pain story, normal walking, motor and sensory deficits are in favor of facet joint pain [15]. Lomber facet syndrome (LFS) may be accepted a loss of lumbar lordosis, sensitivity to palpated facet joints, negative leg flatness test, absence of neurological deficit, negativity of maneuvers that enhance intradiscal pressure. The pain starting over 70 degrees in the straight leg lift test should suggest that it may originate from the facet joint, ligament, or muscles.

Facet joint pain treatment can be classified as medical treatment, physical therapy, percutaneous invasive procedures and surgical treatment. In acute phase, bed rest for a few days is necessary in addition to analgesic, myorelaxan, nonsteroidal antiinflammatory and antidepressant medications [16, 17]. Opioids can be used in pains not responding to these medicines. Lumbosacral corsetry is useful in acute painful periods. In addition, manipulation made at the proper time and facet joint injections can relieve the patient quickly [18]. However, when long-term outcomes are examined, it has been reported that 40% of patients have resumed their complaints after an average of 8 months of these facet joint injections [7]. For this reason, fluoroscopy or CT-guided intra-articular injections have been put forward in order to determine the target with high accuracy in injection procedures and to increase the efficiency of long term injection. However, it is disadvantageous for the imaging system to require a high cost, especially in the process of exposing both the patient and the operating healthcare staff to radiation. Dermatitis secondary to radiation and even the skin cancer cases have been successively reported in the literature shortly after interventions applied with fluoroscopy [19, 20]. Ultrasound-guided interventions, a method of imaging without radiation exposure because of these undesirable side effects, have been prefered all over the world. Ultrasound-guided imaging makes this imaging technique advantageous due to the lack of radiation, real-time imaging, easy portability and partly lower cost. The use of ultrasonography in the facet joint nerve block was described by Greher et al. [21] in 2004 and the use of ultrasonography in spinal procedures after that procedure has increased rapidly [22-25].

When the efficiency of the injected injection has been examined early and mid-term, similar clinical outcomes have been observed in all three patient groups. This result suggests that injections made with ultrasound guidance are minimal as effective as injections with fluoroscopy. The rates of complication and durations of application were similar among all three groups. In addition, no health-care professional has been exposed to any harmful radioactive rays during the injection.

Conclusion

In conclusion, we can say that LFE therapy, which we have applied in normal weight, overweight and obese patients, is an effective treatment method in conservative and post-physical pain relief. When the LFE application has been evaluated with MODI in all three groups, the patients' life quality has improved, and the absence of exposure to radioactive rays during the procedure is also a significant advantage.

Disclosure of conflict of interest

None.

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