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A retrospective study for the effect of local ozone injection for treatment of musculoskeletal disorders

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Abstract

Objective: Aim of this study is to examine the effect of local ozone application on pain in patients who applied to physical medicine and rehabilitation outpatient clinic with knee, shoulder and back pain problems.

Material and Methods: Records of the patients who were consulted to the Physical Medicine and Rehabilitation outpatient clinic of our hospital with the complaints about knee, shoulder and low-back pain, who met the inclusion criteria and were applied local (intraarticular or intramuscular) ozone as per the routine protocol, was retrospectively investigated The study was conducted with 25 patients. A total of 4 sessions of ozone were administered once weekly. Patients were evaluated using VAS (visual analogue scale) at 3 and 5 weeks.

Results: The mean age of the patients was 57.62 ± 17 (33-97) years. 64% of the patients had knee pain, 20% had shoulder pain and 16% had low back pain. The mean VAS score was 7.44 ± 0.91 before treatment, 5.04 ± 1.45 at 3 weeks, and 3.92 ± 1.57 at 5th week. Statistically significant improvement was observed in VAS scores according to pre-treatment.

Conclusion: Local ozone application reduces the pain level of the patients with knee, shoulder or low-back pain.

Keywords: ozone injection, joint, muscle, pain

Introduction

Musculoskeletal pain usually originate from muscles, bones, ligaments and soft tissues. Such pains may lead to serious workforce losses by affecting motive power of the individual. In general, osteoarthritis, meniscus lesions, impingement syndrome, disc pathologies and painful muscle spasms are diagnosed by physicians in outpatient clinics. Oral and topical analgesics are frequently used to treat the pains of musculoskeletal system. Apart from these drugs, complementary products such as glucosamine and chondroitin are prescribed. Exercises, physiotherapy agents, auxiliary devices and protective measures are applied as non-pharmacological treatment methods as part of this treatment. In case of that all of the treatment methods remain incapable, various surgical treatments are implemented (1). Nowadays, ozone therapy can be applied based on numerous indications. Local ozone injections in the treatment of the inflammatory and degenerative diseases related to musculoskeletal system has increased in the recent years which activates the anti-inflammatory and anti-oxidative capacity. Accordingly, various studies on this subject have been performed (2-5).

The purpose of this study is to investigate the effect of local ozone application on the patients who consulted the Physical Medicine and Rehabilitation outpatient clinic due to knee, shoulder and low-back pain, and who were administered ozone therapy.

Material and Methods

The research was performed by retrospectively investigating records of the patients between January 01, 2018 and March 15, 2018 with the complaints about knee, shoulder and low-back pain, who met the inclusion criteria and were applied local (intraarticular or intramuscular) ozone as per the routine protocol.

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1. Inclusion criteria

- All of the male and female patients aged 18 and older
- The patients with the complaints about knee, shoulder and low-back pain, and were approved for local ozone application in consequence of the examinations and investigations, and who accepted local ozone application as part of the protocol

2. Exclusion Criteria

- The patients who were subjected to local ozone application apart from the protocol determined in terms of dose and number of sessions
- The patients who discontinued the treatment because of a complication developed during the local ozone application, or for another reason
- The patients who have known any coagulation disorder, or who use oral anti-coagulant
- The patients who have known glucose 6-phosphate dehydrogenase deficiency
- Pregnant patients
- The patients aged below 18

The patients subject to study provided their detailed medical history related to their complaints to a certain physician in physiotherapy outpatient clinic before the application of local ozone therapy. The same physician examined them and evaluated their suitability for local ozone therapy. The patients who were deemed suitable for the therapy and accepted the therapy with informed consent form were administered local ozone application as part of a definite protocol.

Protocol

All patients whose data was scanned in the study received four sessions of local ozone application; the application was performed by giving 20 cc every time as follows: 20µg/ml in Session 1, 15µg/ml in Session 2, and 10µg/ml in Sessions 3 and Session 4. Local ozone was applied to knee joint with anterolateral approach as the patient was in supine position and his/her knee flexion angle was 90 (Figure 1). Ozone was administered to shoulder joint with posterior approach as the patient was in sitting position (Figure 2). Ozone was applied to low-back region of the patient who was in prone position, from 2 cm lateral of the inter-spinous regions (Figure 3). All of the ozone applications were performed under sterile conditions. Pain levels of the patients subject to therapy were assessed prior to application and in weeks 3 and 5 after the first application by the same physician who used visual analog scale (VAS). VAS is a one-dimensional measure of pain intensity, which has been widely used in patients for pain with many rheumatic diseases. It is a continuous scale comprised of a vertical line, usually 10 centimeters in length, anchored by 2 verbal descriptors which is most commonly anchored by "no pain" (score of 0) and "worst imaginable pain" (score of 10 [10cm scale]) (6). Data of the patients who discontinued the treatment because of a complication developed during the local ozone application, or for another reason was not used in our study.

SPPS soft-ware 22 was used for the statistical analysis of the data obtained from the records of the patients. The Kolmogorov Smirnov test, Friedman's test, and Wilcoxon signed-rank test were used for statistical analysis. The level of statistical significance was set at $p < 0.05$.

Figure 1: Ozon treatment application for Knee

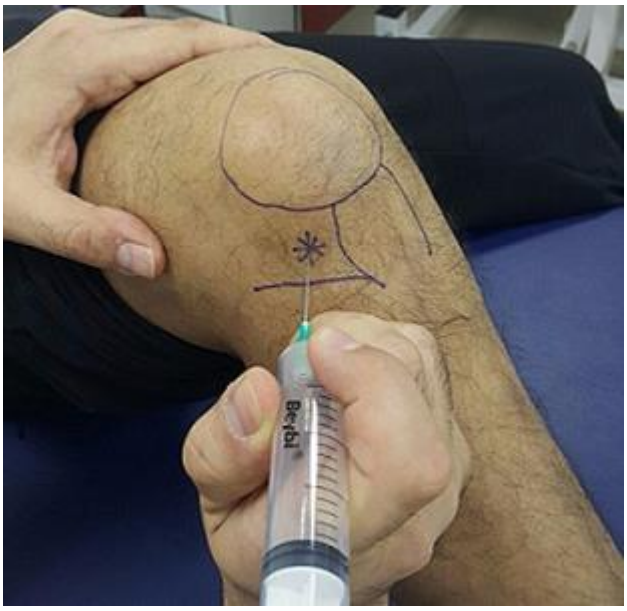

Figure 2: Ozon treatment application for shoulder

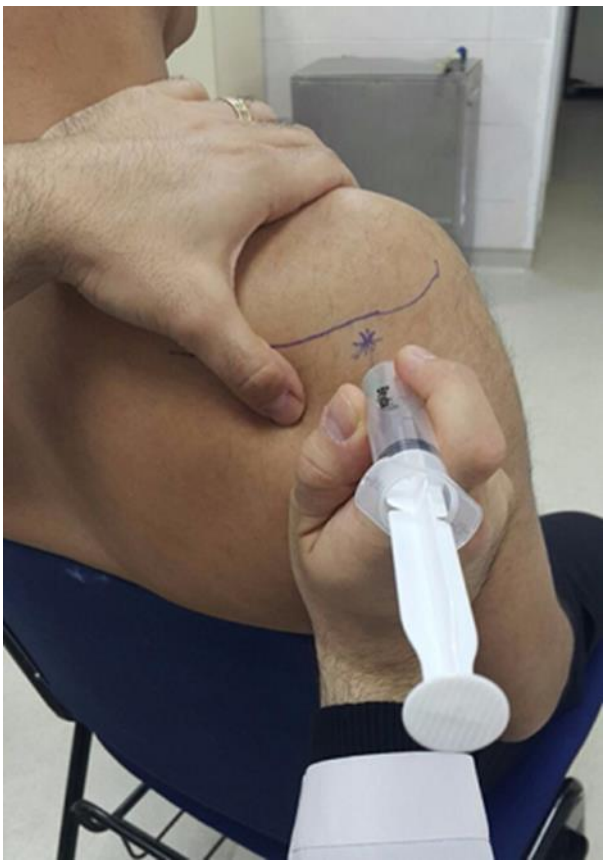

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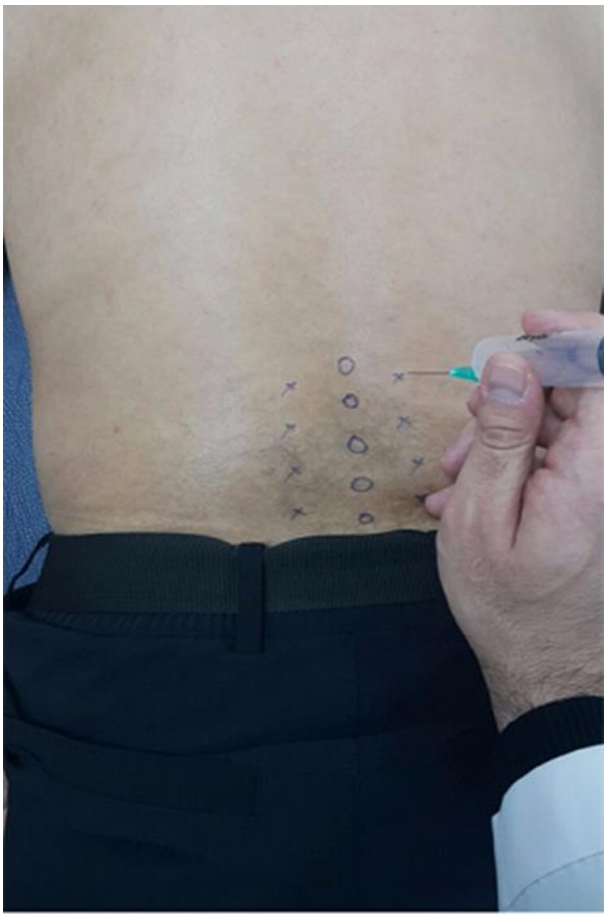
Figure 3: Ozon treatment application for low-back pain



Results

Data of 25 patients who were subject to local ozone therapy in line with the protocol determined was included in our study.

The therapy was applied to knee joints of 16 patients, shoulder joints of five patients and lumbar region of four patients. Demographic data of the patients included in the study is given in Table 1.

When the pain levels measured prior to the therapy, and in weeks 3 and 5 after the therapy were compared, the decrease in the pain levels were found to be statistically significant ($p<0.05$).

All of the VAS parameters improved significantly at 3 weeks post treatment, as compared to baseline, and the observed improvement increased at 5 months post treatment ($p < 0.05$) (Table 2).

The maximum decrease in pain level among all of the painful groups (knee, shoulder and low-back) was seen in Week 5 (Table 2).

Table 1: Demographic distribution of Patients

Age (mean±sd, min-max)	57.62 ± 17 (33-97)
Gender (F/M, %) (n)	60/40 (15/10)
Knee pain (%) (n)	% 64 (n=16)
Shoulder pain (%) (n)	% 20 (n=5)
Low back pain (%) (n)	% 16 (n=4)

Table 2: Pre-treatment Post-treatment Measurements

Measure (VAS)	Pre-treatment	Post-treatment week 3	Post-treatment week 5	P value
Knee	7.62 ± 0.8	5.12 ± 1.62	4.18 ± 1.75	<0.05
Shoulder	6.80 ± 0.83	5.20 ± 0.44	4.00 ± 0.70	<0.05
Low-Back	7.50 ± 1.29	4.50 ± 1.73	2.75 ± 1.25	<0.05
Total	7.44 ± 0.91	5.04 ± 1.45	3.92 ± 1.57	<0.05

P value <0.05 was considered as statistically significant.
Friedman test was used for intergroup comparison
Wilcoxon test was used for post-hoc comparison

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Discussion

In this study, effect of the local ozone application on the pain level was investigated by retrospectively scanning the data of the patients who were administered local ozone based on a definite protocol. It was concluded that this treatment method may give positive results in the pain levels.

Lopes de Jesus et.al (7) compared intra-articular ozone application in osteoarthritis to placebo in their randomized controlled study. They found out that the change in pain level of the group subject to local ozone was more significant. Unlike our study, 20 µg/ml dose of 10 cc ozone was administered in every session in that study, a total of eight sessions each of which was applied weekly were performed and the assessment was made in weeks 4, 8 and 16. Similar to our study, VAS was used for the evaluation of pain. The pain level of the patients decreased gradually with the ozone application just as in our study. Unlike our study, the patients were followed up for a long period and it was reported that analgesic effect of the local ozone application continued until week 16.

Rayegani SM et.al compared the efficacy of intra-articular ozone application in osteoarthritis to that of hyaluronic acid (HA) application (8). Thirty µg/ml dose of 10 cc ozone was administered to patients in ozone group once a week while the patients in HAgroup received 20 mg/2 mL dose of intraarticular injection once a week. Pain scores of the patients in both groups before the treatment and in month 6 after the treatment of 3 sessions were evaluated. Significant improvement in the pain levels of both groups was reported. It can be concluded accordingly that intraarticular ozone application in osteoarthritis can be preferred instead of HA injections due to its cost efficiency. However, similar studies about this subject reported that pain level of the patients subjected to HA injections improved further and the asymptomatic period of such injections was longer than that of the local ozone application during long-term follow-ups (9; 10).

Duymuş et.al made a comparison between intra-articular HA, intra-articular Platelet Rich Plasma (PRP) and intraarticular ozone application in osteoarthritis (9). Unlike our study, 30 µg/mL dose of 15 cc ozone was applied in that study. However, a total of four sessions each of which was performed once a week was applied just line in our study. Duymuş et.al.(9) followed up their patients for 12 months. Although decrease in pain level and clinical effectiveness were seen in three groups at the end of first three months, they were reported to be more significant in PRP and HA groups. At the end of six months, the clinical effectiveness of PRP and HA groups continued, but pain levels of the ozone group got back to initial levels. According to 12-month evaluation, the clinical effectiveness of PRP and HA groups declined. However, the decrease in PRP group was lower. It can be concluded based on the said study that PRP and HA applications are more effective and give more lasting results compared to local ozone application. Further studies are required to arrive at a final decision regarding this subject.

Biazzo et al (5) conducted a study to seek the efficacy of local ozone application in the patients with low-back pain. They administered 27 µg/ml dose of 20 cc ozone to lumbar para-spinal muscles of the patients for 12 weeks, and determined that VAS scores of 79 percent of the patients declined at the end of the treatment. Despite the application of four sessions in our study; pain levels of all patients whose lumbar regions were subjected to local ozone decreased. We believe that the proper dose and number of sessions for low-back region will be clarified further by new future studies.

Conclusion

In consequence, local ozone application reduces the pain level of the patients with knee, shoulder or low-back pain. However, more sophisticated studies which include more participants and focus on the other disorders in physical medicine and rehabilitation are needed.

Limitations: The most important limitations of our study were the absence of control group and small patient group. The other limitations are as follows: Long-term follow-ups of the patients were not performed and evaluation about the other subjects, except pain scale was not made.

Conflict of Interest: The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Author's Contributions: EA: Research concept and design; Patient examinations, Treatment, data collecting, analysis and interpretation of data**.** Preparation of article, and Revisions. All authors approved the final version of the manuscript.

Ethical issues: All Authors declare, Originality and ethical approval of research. Responsibilities of research, responsibilities against local ethics commission are under the Authors responsibilities. The study was conducted under defined rules by the Local Ethics Commission guidelines and audits.

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