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Evaluation of the effectiveness of ice pack therapy on pain after extraction of mandibular third molar

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Abstract

Aim: The aim of this study was to evaluate the efficacy of ice pack therapy on pain after mandibular third molar extraction.

Material and methods: Thirty patients who required extraction of mandibular third molars and satisfied the inclusion criteria were included in the study. Bilateral full erupted mandibular third molars were extracted under local anesthesia. Routine medication and ice pack therapy (directly over the masseteric region of the surgery region for 12 hours, intermittently for 20 minutes) were performed after one side mandibular third molar extraction and only routine medication was applied after other side mandibular third molar extraction. The pain was evaluated with Visual Analog Scale. The Student t-test was applied to compare pain levels between groups.

Results: The study was carried out in 30 patients, 15 female and 15 male with a mean age of 21.53±2.22 years. There was a statistically significant difference in the evaluation of VAS levels in postoperative 4, 6, 8, 12, 24 hours between the groups. Pain levels of female were found to be higher than male at 2nd, 4th, 6th and 24th hours in the non-ice pack therapy group and found to be higher than male at 4th, 6th and 8th hours in the ice pack therapy group.

Conclusion: Pain levels after mandibular third molar extraction were significantly lower who had an ice pack therapy. Ice pack therapy is a viable alternative mode of improving the quality of life of patients after the extraction of third molars.

Key words: third molar, tooth extraction, cryotherapy, cold therapy, pain

Introduction

The third molar tooth extraction is a common treatment in the oral surgery and general dentistry routine [1]. Extraction of third molars is associated with complication that can be as common as pain. After a short time from the extraction of third molars, pain may occur and gradually increase its severity [2,3]. Pain that starts after tooth extraction reaches its maximum level between postoperatively 6-12 hours [4]. This pain has a negative effect on the quality of life in the postoperative period [5].

Many pharmacological methods such as preoperative and postoperative antibiotics, analgesics and corticosteroids and non-pharmacological methods such as cryotherapy (postoperative application of ice packs, etc.) massage, laser are used in order to reduce the severity of pain after the extraction of the third molars [6-9].

Cryotherapy is a non-pharmacological pain control method that is commonly used in clinical practice and helps prevent complications such as pain, edema and hematoma [4,10]. Cryotherapy shows the effect of low temperature and vasoconstriction in the related region of vessels and reduction in metabolic rates [10]. There are different types of cryotherapy. The simplest, most common, and most economic type of cryotherapy is the cold application with ice packs [11]. Oral surgeons and dentists often recommend that patients apply ice packs for analgesic and anti-swelling purposes after extraction teeth and various oral surgery treatments [12].

Therefore, the aim of this study was to evaluate the effect of ice pack application on pain following third molar extraction. The study was based on the "null hypothesis" that there is no difference in pain of subjects who applicate ice pack therapy and those who do not applicate ice pack therapy after mandibular third molar extractions.

Material and methods

This study was approved by the Faculty of Medicine Research and Ethics Committee (Date: 29.03.2017, Decision Number: 3/10). All the patients were given detailed information about the study and consent form was taken from them. It was a prospective clinical study to evaluate the effect of ice pack therapy following extraction of mandibular third molar. This clinical study was performed with 30 patients. Patients between the ages of 19 and 26 years who presented for the extraction of mandibular bilateral third molars were included in the study. The number of patients to be included in the study was determined to power analysis. The patients included in the study were systemically healthy individuals and all patients had a bilateral full-erupted third molar in a vertical position. Patients with contraindications to the use of cryotherapy (cold intolerance, Raynaud's disease, cold urticaria, cryoglobulinemia, etc.) were excluded.

A total of 60 mandibular third molar teeth were extracted in 30 patients. All mandibular third molars were vertically position, full-erupted and the roots of teeth were conical. All patients could easily open their mouths over 45mm. Bilateral third molar extraction was performed under anesthesia of the inferior alveolar nerve and buccal nerve blocks (1:100,000 adrenaline and 2% articaine hydrochloride) by the same surgeon. All mandibular third molars had the same degree of difficulty. All tooth extractions were completed without any complications such laceration of flap, fracture of root etc. To ensure that post-extraction ice pack therapy does not disturb the patients' sleep patterns and to be applied regularly, tooth extractions were performed daily between 09:00-11:00 in the morning. After the one side mandibular third molar tooth extraction, paracetamol 500mg (Atabay Chemical Industry Trade Inc.) and chlorhexidine gluconate 2% (Chlorhex Gargle 200ml, Drogsan Pharmaceutical Industry) were administered to each patient twice daily at the same time for 5 days. In addition, patients were instructed to apply ice packs (cryotherapy) directly over the masseteric region of the surgery region for 12 hours, intermittently for 20 minutes. This first ice pack application was supervised in the clinic by the surgery nurse and assistant physician. Patients were given an appointment for extraction of the other side mandibular third molar tooth after 15 days. After the other side mandibular third molar tooth extraction, only the above prescribed medications were given.

10cm Visual Analogue Scale (VAS) was used for postoperative pain evaluation. Patients were asked to fill VAS at 2, 4, 6, 8, 12 and 24 hours after mandibular third molars extraction. The patients were informed about how to fill the scale by the researcher.

The statistical analyses were performed using the statistical program 'Minitab 17' (Minitab Inc., State College, PA, USA). Student t-test was used to compare parametric data between two groups. Ordinal variables were analyzed as arithmetic mean and standard deviation, minimum, maximum and median values. In calculating the sample size, the statistical power of the study was set at 80% and the critical level of significance was set at $p<0.05$ and $p<0.001$.

Results

The study was conducted on 30 patients (15 females, 15 males) with a mean age of 21.53±2.22 years. The mean age of female patients was 21.26±2.31 years and the mean age of male patients was 21.80±2.17 years; no statistically significant difference was found ($p= 0.521$, $p>0.05$).

Pain levels of ice pack therapy group were found to be lower than the non-ice pack therapy group at 4th, 6th, 8th, 12th and 24th hours. This difference between pain levels was found to be statistically significant ($p<0.05$, $p<0.001$) (Table 1).

Table 1 Comparison of VAS levels between ice pack therapy group and non-ice pack therapy group

VAS	Non-Cryotherapy Group Mean±SD	Cryotherapy Group Mean±SD	P value
2nd hour	2.53±1.66	1.83±1.26	0.071
4th hour	3.90±1.27	3.27±1.05	0.04*
6th hour	5.07±1.31	4.23±1.17	0.012*
8th hour	6.13±1.01	5.20±0.66	0.000**
12th hour	5.53±0.93	4.63±0.71	0.000**
24th hour	4.56±0.93	3.90±0.80	0.004*

Student t test * $p<0.05$ ** $p<0.001$

Pain levels of female were found to be higher than male at 2nd, 4th, 6th and 24th hours in the non-ice pack therapy group. This difference between pain levels was found to be statistically significant ($p<0.05$, $p<0.001$) (Table 2).

Table 2 Comparison of VAS levels between female and male in non-ice pack therapy group

VAS	Female Mean±SD	Male Mean±SD	p
2nd hour	3.13±1.77	1.93±1.33	0.046*
4th hour	4.66±0.90	3.13±1.13	0.000**
6th hour	5.80±1.26	4.33±0.90	0.001*
8th hour	6.40±1.12	5.86±0.83	0.152
12th hour	5.86±0.99	5.20±0.77	0.050
24th hour	5.67±0.79	4.67±0.79	0.002*

Student t test * $p<0.05$ ** $p<0.001$

Pain levels of female were found to be higher than male at 4th, 6th and 8th hours in the ice pack therapy group. This difference between pain levels was found to be statistically significant ($p<0.05$, $p<0.001$) (Table 3).

Table 3 Comparison of VAS levels between female and male in ice pack therapy group

VAS	Female Mean±SD	Male Mean±SD	p
2nd hour	2.60±1.40	1.73±1.22	0.083
4th hour	3.93±0.59	2.60±0.98	0.000**
6th hour	4.87±1.13	3.60±0.82	0.002*
8th hour	5.46±0.51	4.93±0.70	0.026*
12th hour	4.80±0.56	4.46±0.83	0.211
24th hour	4.13±0.51	3.66±0.97	0.117

Student t test * $p<0.05$ ** $p<0.001$

DISCUSSION

Tooth extraction is one of the most commonly used procedures of dental practice and oral surgery. The high incidence of complications such as pain after such applications is the first choice for investigating postoperative analgesic drugs and methods to control postoperative complications [7-9]. In this study was performed on the third molar tooth extraction in accordance with the literature.

Many studies in the literature have reported that the most severe pain occurs after 6-8 hours after tooth extraction [13,14]. In this study, it was found that the most severe pain following tooth extraction occurred at the 8th postoperative hour.

As a result of their study, Fisher et al. and Eroglu at al. found that female patients experienced more severe pain than the male patients after the impacted third molar extraction. In this study, it was found that female patients experienced more severe pain than male patients after the third molar tooth extraction [15,16].

Ice pack therapy has been used in the treatment of some diseases and disorders since ancient medicine. Ice pack therapy is a non-pharmacological method used in pain control. Cold application is effective in reducing pain in two ways. First, cold application relieves or reduces pain by eliminating edema and muscle spasm. Secondly, it is effective in relieving pain by slowing or blocking the conduction of peripheral nerves [17]. For these reasons, we evaluated the effectiveness of ice pack therapy in pain after extraction of third molar teeth in this clinical study.

Ibikunle and Adeyemo evaluated the effects of ice pack therapy on quality of life after impacted third molar surgery. They divided the patients into two groups, and the patients in one group received ice therapy for 24 hours at 30 minutes over the masseteric region on the surgery side after third molar surgery. As a result of their study, they found that the ice pack therapy group had lower pain levels and a higher quality of life [10]. In this study, bilateral mandibular molar tooth extraction was performed on 30 patients. After the one side mandibular third molar tooth extraction, medical medication was applied. In addition, patients were instructed to apply ice packs therapy directly over the masseteric region of the surgery area for 12 hours, intermittently for 20 minutes. After the other side mandibular third molar tooth extraction, only medical medication was applied. In the post-extraction pain evaluation, it was found that the pain level in the ice-treated group was lower.

Zandi et al. performed symmetrical bilateral mandibular third molar surgery in 30 patients, in their study. After surgical removal on one side, the patients had applied cold therapy for 24 hours at 20 minutes intervals and the other side (control); no cold therapy was given. They evaluated the effects of cold application on pain, edema, and trismus on the 2nd and 7th days postoperatively and could not detect any difference between the cold application group and the control group. In conclusion, they reported that cold application had no positive effect in terms of postoperative complications in mandibular third molar surgery [9]. In the present study, bilateral mandibular molar tooth extraction was performed on 30 patients and after tooth extraction on one side (intervention), the patients had applied cold therapy for 12 hours at 20 minutes intervals and the other side (control); no cold therapy was given after tooth extraction. The pain was evaluated with VAS at postoperative 2, 4, 6, 8, 12, and 24 hours and it was concluded that ice pack therapy was effective on pain. The reason for the different results of the studies, Zandi et al. evaluated pain, edema, and trismus on the 2nd and 7th postoperative days [9]. We think that this period is a long time in evaluating the effectiveness of the ice pack therapy.

In a clinical study by Van der Westhuijzen et al. patients who underwent bilateral mandibular third molar surgery were divided into two groups. One group received bilateral facial ice pack treatment for 24 hours, intermittently for 15 minutes postoperatively, while the other group did not receive cold treatment. As a result of the study, the effect of facial ice application on pain, edema, and trismus was evaluated between the two groups, but no difference was found between the group applying facial ice and the control group [18]. In the present study, bilateral mandibular third molar extractions were applied and after the third molar extraction, the ice pack was applied to one side at 20 minutes intervals for 12 hours, while the other side was not applied ice. As a result of this study, ice pack application was found to be effective on pain after tooth extraction unlike to Van der Westhuijzen et al.'s results of study [18].

Herera et al. reported that the application of cold, massage with cold and immersion in cold water has an effect on pain [19]. Rana et al. reported that ice application is beneficial in preventing complications such as pain, edema and trismus after the third molar surgery [12]. Bastian et al. and Laureano et al reported that ice pack therapy after oral surgery was effective in pain control, while Nusair and Ylipaavahiemi et al. reported no effect on pain [20-23]. In this study, we found that ice pack therapy has a reducing effect on pain after extraction of third molar tooth.

MacAuley et al. reported that ice therapies administered at 10-minute intervals were effective on pain as a result of literature review [24]. Kuo et al. evaluated the effectiveness of 10, 20 and 30 minute ice therapies on pain in soft tissue injuries. As a result, they did not find any difference between the groups [25]. In the present study, we found that ice pack therapy at 20-minute intervals for 12 hours following the third molar tooth extraction had a very positive effect on pain.

Pain levels after extraction of third molar tooth was significantly better in subjects who had ice pack therapy than those who did not have ice pack therapy. Ice pack therapy is an effective method for the treatment of pain after third molar tooth extraction in addition to medical therapy. Ice pack therapy is a common, simple, convenient, economic and without side effects method for pain control after tooth extraction.

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