

Comparison between the Efficiency of Alo evera Extract and Alvogyl in Dry Socket (Alveolar Osteitis) Management

Research Article

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Abstract

Background: Dry socket is the most common complication following tooth extraction. However, it is a painful and annoying condition for the patient, and up to the present time the causes of this condition have not been precisely determined, and the proposed treatments aim to relieve symptoms, until the socket heals itself.

Aim: The main objective of this study is to compare the efficacy of Alo evera extract and Alvogyl in pain relief associated with dry socket.

Materials and Methods: 40 patients (ranged from 29 to 60 years), who had dry socket after tooth extraction in the molar region, were included in the study. They were divided equally and randomly into two groups: group A (Aloe vera) and group B (Alvogyl). Pain values were recorded in the two groups after 2, and 7 days.

Results: After 2, and 7 days Aloe vera showed a statistically significant difference in relieving pain compared to Alvogyl (p-value < 0.05).

Conclusion: The use of Aloe vera extract shows promising results in terms of pain relief in patients with dry socket.

Keywords: Dry Socket; Aloe vera Extract; Alvogyl.

Introduction

Dry socket is the most common post-extraction complication [1]. This term first appeared in the literature in 1896 by Crawford [2], since that many terms have appeared to refer to this complication as: alveolar osteitis (AO), localized osteitis, postoperative alveolitis, alveolalgia, alveolitis sicca dolorosa, septic socket, necrotic socket, localized osteomyelitis, and fibrinolytic alveolitis. However, the term dry socket is still the most common term [3]. In 2002 Blum suggested a definition that can be used universally as a standard definition of dry socket: "postoperative pain in and around the extraction site, which increases in severity at any time between 1 and 3 days after the extraction accompanied by a partially or totally disintegrated blood clot within the alveolar socket with or without halitosis" [3]. Studies with large sample sizes indicate that the incidence of dry socket after routine tooth extraction is recorded at rates less than 5% [4]. Blum stated that well-controlled studies have reported the incidence as 25-30%

after the removal of impacted mandibular third molars [3]. The etiology of dry socket is not precisely defined [5]. However, Birn suggested that dry socket develops because of high fibrinolytic activity in and around the socket, which can lead to dissolution of the blood clot [6]. The increase in locally fibrinolysis is a result of an increase in the pathways of converting plasminogen to plasmin [7], which is stimulated by an elevated release of tissue activators released from the alveolar bone infected or traumatized [8]. The tissue activators release two types of enzymes, bradykinins and kininogenases, which play a vital role in generating the perception of pain [7]. Dry socket starts between the first and the third day after tooth extraction and 95% to 100% of cases occur within a week of extraction [9, 10]. Studies published in the literature indicate several contributing factors to be associated with increased risk of dry socket, including: traumatic extraction [11], taking oral contraceptives, bad oral hygiene [12], patient sex [13], smoking [14], age [15], extraction site, and previous experience of dry socket [3]. Management strategies for dry socket work to relieve patient's pain, and protect the site until healing occurs spontane-

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ously. Alvogyl dressing is commonly used for management of dry socket, which contains eugenol (analgesic and anti-inflammatory), iodoform (antimicrobial), and butamen (anesthetic) [16].

Aloe vera (*Aloe barbadensis*) is one of the most popular plants nowadays and it is receiving remarkable scientific interest. The history of this plant's use goes back to the Babylonian era. Aloe vera grows in warm areas and cannot survive in freezing temperatures [17]. There are about 75 active chemical compounds in Aloe vera, including vitamins A, B and C, which have a positive effect on the immune system, as well as vitamin C has a role in wound healing, enzymes (such as Carboxy-peptidase, which helps reduce inflammation), sugars (including gluco-mannans, which accelerate the healing process of wounds), sterols: these compounds have an anti-inflammatory role (such as Lupeol, which has an antiseptic and analgesic role) [18], and anthraquinones which when present in small amount are considered strong analgesics [19]. Aloe vera has been used in many aspects within dentistry, including, oral lichen planus, periodontitis, dry socket, and root canals filling material in primary teeth [18].

Materials and Methods

A randomized controlled clinical trial was conducted at the department of oral and maxillofacial surgery/Faculty of Dentistry/Damascus University. Before starting the procedure, approval was taken from the Research and Ethics Committee.

Sample size was calculated based on G power. 40 patients (25 females and 15 males ranged between 29 to 60 years) established dry socket after maxillary or mandibular molar extraction (36 cases in mandibular molar region, 4 cases in maxilla molar region), who have not received any treatment. Patients free from any systemic diseases and without any signs of active infection in extracted sockets were included in the study. Exclusion criteria: were Pregnant and lactating women, or patients on oral contraceptives, previous history of antibiotic and anti-inflammatory therapy for the treatment of dry socket, participants without any underlying systemic disease or compromised immunity, smokers, and patients, who did not commit to attend follow-up and monitoring sessions.

The patients were divided equally and randomly into two groups using flipping a coin.

Group A (study group): Included 20 patients (7 males and 13 females). Aloe vera extract was applied to the dry infected socket.

Group B (control group): Included 20 patients (8 males and 12 females). Alvogyl was applied into the socket infected with dry socket.

Method of preparation of Aloe Vera extract

Aloe Vera extract was obtained by working in the postgraduate laboratory/department of Pharmacognosy/Faculty of Pharmacy/Damascus University. The fresh Aloe vera leaves were collected from the plant, washed in the running tap water for 15 minutes then rinsed with sterile distilled water [20], disinfected with 70% ethanol alcohol [21], cut with a sterile knife, and then dried well (several days) outdoors. The dried plant cuttings were then crushed into small pieces. The weight of these pieces that

would be subjected to the extraction process was recorded [22]. A standardized weight of 20.06 grams was obtained for all pieces. The plant extracts were prepared by using soxhlet apparatus using distilled water as a solvent for several hours [22].

The extraction was done by maceration method, where 20.06 grams of the plant were placed in a Laboratory flask and 200 ml of distilled water were added to it. The extraction process lasted for two days. After the completion of the extraction process, the liquid extract was collected and dried using a rotary evaporator device until it was completely dry, then the extracted sample was weighed to 8.3 grams.

The extraction yield was determined according to the following method:

$$x = \text{extraction yield}$$

$$x = \left(\frac{\text{weight of sample after extraction}}{\text{weight of sample before extraction}} \right) \times 100$$

$$x = \left(\frac{8.3}{20.06} \right) \times 100$$

$$x = 41.37\%$$

The extract was then collected and stored in a sterile, opaque glass container at room temperature and closed well until use.

Alvogyl dressing

Alveopaste Pengha Iodoform Paste (Manufacturer- Produits Dentaires Switzerland) was used. Each jar (15grams) contains: Penghawar -Djambi 4% (hemostatic), Iodoform 16% (antiseptic), Ethyl Aminobenzoate 26% (local anesthetic), Eugenol 14%, Oil of Mint 8%, and excipient ad 100%.

Treatment Protocol

After taking the medical history of the patient and the agreements to the conditions of the study with the written consent, the group in which the patient will enter is chosen by flipping a coin.

A gentle irrigation of the socket was performed with a warm saline then a small cotton swab was passed over the socket walls to remove food debris, and remnants of the disintegrated clot, taking care not to curettage the socket walls. Irrigation was repeated again, then the aforementioned commercial Alvogyl dressing was placed intra-socket and a piece of sterile gauze is placed over the socket. Patient was asked to follow-up after 48 hours. After that, the socket was re-irrigated with saline. A clean dressing was put back in. The patient was asked to follow-up after 48 hours, assess the patient's condition and apply a new dressing when needed. The patient was asked to follow-up after two days to evaluate his condition in the control group.

In the study group, several drops of sterile distilled water was added to the Aloe vera extract, to be placed intra-socket instead of Alvogyl dressing. A piece of sterile gauze was placed over the extract and applied intra-socket.

Patients' pain values were recorded 2, and 7 days after the start of treatment in both groups using a visual analog scale (VAS), which is based on the patient's personal experience and consists of a ruler of 10 cm in length printed on its left end (no pain) and printed on the right end. (worst pain) and the patient was asked to

point the location on the ruler representing severity of his pain. (Figure 1)

Statistical Analysis

Normality of distribution was checked with Kolmogorov-Smirnov test. Data showed normal distribution.

Data were analyzed using SPSS V.23 (IBM; CORP, ARMONK, USA). The level of the P value was set 5%, and the level of confidence was set at 95%.

Results

Descriptive results for intergroup: The mean VAS scores at baseline in group A and group B were 7.70 ± 0.73 and 7.60 ± 0.88 respectively. After 2 days, results were 2.50 ± 0.95 and 3.80 ± 0.83 respectively. Moreover, after 7 days scores were 0.20 ± 0.41 and 0.70 ± 0.92 respectively.

Intergroup comparison: The unpaired t-test was used to compare the mean VAS scores between the two groups. Results showed that pain score after 2, and 7 days were significantly better in Aloe

Vera group compared to Alvogyl group ($p < 0.05$). (Table 1)

Intragroup comparison: The unpaired t-test was used to compare the mean VAS scores. The observed results showed a significant reduction in mean scores of VAS when comparing between two periods (After 2 days- Baseline), (After 7 days- Baseline), and (After 7 days- After 2 days) in both groups ($p < 0.00$ (Table 2).

Discussion

Dry socket is a self-limiting condition. Although it is extremely debilitating and painful [23], dentists often underestimate the severity of the pain experienced by patients, and these patients are not given adequate attention and care [24].

This study found that both Aloe vera extract and Alvogyl had an effect in relieving pain after (2 and 7) days in patients with dry socket. Supe et al. found that the mean VAS scores in Alvogyl-treated group were 3.96 and 0.44 on the third and seventh day, respectively after application of the treatment. Their study concluded that Alvogyl had a faster effect on pain relief than Zinc oxide eugenol in patients with dry socket [25]. Lenka et al. found that the mean VAS scores were 2.90 and 4.10 in the Alvogyl-treat-

Figure 1. Visual analog Scale.

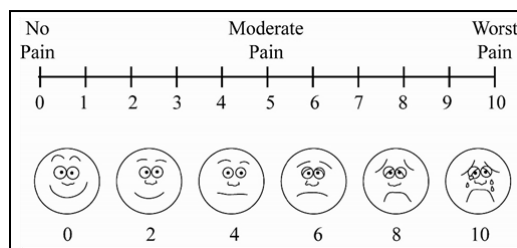


Table 1. Comparison of visual analogue pain scale between group A, and B.

	VAS	Groups	Mean	Std. Deviation	t-test value*	P-value	Mean Difference
Intergroup comparison	Baseline	Group A	7.70	0.73	0.39	0.699	0.10
		Group B	7.60	0.88			
	After 2 days	Group A	2.50	0.95	-4.611	0.000**	-1.30
		Group B	3.80	0.83			
	After 7 days	Group A	0.20	0.41	-2.213	0.033**	-0.50
		Group B	0.70	0.92			

*Unpaired t-test, **significant difference ($p < 0.05$).

Table 2. Comparison of visual analogue pain scale between two periods Intragroup.

	Groups	Compare VAS between the two periods:	t-test value*	P-value	Mean Difference
Intragroup comparison	Group A	After 2 days- Baseline	-27.9	0.000**	-5.2
		After 7 days- Baseline	-48.734	0.000**	-7.5
		After 7 days- After 2 days	-15.657	0.000**	-2.3
	Group B	After 2 days- Baseline	-20.389	0.000**	-3.8
		After 7 days- Baseline	-36.208	0.000**	-6.9
		After 7 days- After 2 days	-19.304	0.000**	-3.1

*Unpaired t-test, **significant difference ($p < 0.00$).

ed group, and Zinc oxide eugenol-treated group, respectively, and they concluded that Alvogyl significantly better in relieving pain than Zinc oxide eugenol dressing [26]. Faizel et al carried out a study that concluded that initial onset of analgesia was quicker with Alvogyl than Neocone and Zinc oxide eugenol, but Neocone was able to provide early and lasting pain relief. Further, fewer change of dressings was required with Neocone as compared to the other two [27]. Alvogyl contains eugenol, which can also inhibit the inflammatory process and provide analgesic effects by inhibiting the action of prostaglandins [28]. The result of this study showed that the pain score was significant lower in Aloe vera extract-treated group compared to Alvogyl-treated group 2 and 7 days from the baseline (p-value <0.05). Nimma et al. published a study about the effectiveness of aloe vera in healing the socket after extraction, it included two groups (20 patients in each group), the authors prescribed only analgesics in the first group, and in the second group patients were given Aloe vera soaked gel foams (almost 500 mg capsule of Aloe vera powder was mixed with 2 ml of saline and then it was soaked with gelatin foam placed in the socket), the authors concluded that there were statistical differences in the group treated with Aloe vera in analgesia following a tooth extraction on the third and seventh day [29]. Kaya et al. found that Salicept Patches can be used as an alternative to Alvogyl in the management of dry socket, as the authors found no statistical differences in pain relief between the Alvogyl-treated group and the Salicept Patches-treated group [28]. The Salicept Patch is a freeze-dried pledget that contains Acemannan Hydrogel (Carrington Laboratories) obtained from the clear inner gel of Aloe vera L. [30]. Acemannan inhibits the inflammatory process and relieves pain by interfering with the arachidonic acid pathway by way of cyclooxygenase [28].

The current study used the extract of whole Aloe Vera leaf to take advantage of the effects of compounds believed to contribute to pain relief, including: 1- Carboxy-peptidase which inactivates bradykinins and produces an anti-inflammatory effect. During the inflammatory process, bradykinin produces pain associated with vasodilation and, therefore, its hydrolysis produces an analgesic effect. 2-Anthraquinones in small amounts these compounds possess powerful analgesic [19]. 3-Lupeol which acts as an anti-septic and analgesic agent [18]. 4- Phenylalanine, this amino acid has anti-inflammatory effects by reducing vasodilation, therefore, reducing pain. 5- Salicylic acid, which works to prevent prostaglandin biosynthesis from arachidonic acid, which also reduces vasodilation and thus relieves pain [29]. In addition to Acemannan, whose mechanism in pain relief action was aforementioned.

Conclusion

Since pain is the main symptom of dry socket and the main reason for patients to visit the dentist, the current study focused on pain management associated with dry socket.

This study found that Aloe vera extract and Alvogyl were both effective in relieving pain in patients with dry socket. Aloe vera extract is superior to Alvogyl in its capacity to decrease pain level. Further investigations should be conducted to Aloe vera capacity in accelerate granulation tissue and healing epithelium formation in the dry socket, and its relationship with the patients' pain values.

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