



ORIGINAL RESEARCH PAPER

Surgery

COMPARATIVE EVALUATION OF HONEY EXTRACT AND ZnO-EUGENOL DRESSING FOR MANAGEMENT OF ALVEOLAR OSTEITIS : PROSPECTIVE STUDY

KEY WORDS: Alveolar osteitis (AO) ; alveolalgia ; Visual Analogue Scale (VAS); zinc oxide eugenol (ZOE)

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ABSTRACT

Aim: To determine the efficacy of honey in enhancing the soft tissue healing of the dry socket after tooth extraction.
Methodology: Total of 70 patients were taken and divided into 2 groups, Experimental group (honey) (n=40) and control group (zinc oxide eugenol) (n=30). Honey extract was used as socket dressing in experimental group and ZOE in control group. No post operative antibiotic was given in either group but analgesic was allowed as per need. The parameters like pain, swelling, redness, formation of granulation tissue, sign of infection were assessed immediate postoperatively up to 3 weeks.
Results : Honey reduces the pain intensity in experimental group as compared to control group but the result was statistically not significant (p> 0.05.) Formation of granulation tissue and resultant healing of socket was enhanced in honey group than ZOE group and result was statistically significant(p< 0.05). Other clinical parameters like swelling, redness, halitosis, trismus were also lower in honey group as compared to ZOE group though result was statistically insignificant.
Conclusion: As an alternative to traditional medicaments used , honey reduces the pain severity, enhances the soft tissue healing in dry socket, however small sample size and only clinical aspects of socket healing measured are our limitations and further research is recommended.

Introduction:

“Dry socket” was first described in the literature in 1896 by Crawford [1]. Since then, other terms have been used to refer to this complications, such as “alveolar osteitis”, “alveolitis”, “localized osteitis”, “alveolitis sicca dolorosa”, “localized alveolar osteitis”, “fibrinolytic alveolitis”, “septic socket”, “necrotic socket”, and “alveolalgia”.For routine dental extractions, the incidence of AO has been reported in the range 0.5% to 5%. The incidence of AO after extraction of mandibular third molars varies from 1% to 37.5% It has been well documented that surgical extractions result in about 10 times higher incidence of AO .[2,3]

RISK FACTORS : Extraction of mandibular rather than maxillary teeth, Extraction of third molars especially impacted lower third molars , Singleton extractions, Traumatic and difficult extractions , Female sex especially if using oral contraception, Poor oral hygiene and plaque control, Active or recent history of acute ulcerative gingivitis or pericoronitis associated with the index tooth ,diabetes, Smoking, especially if > 20 cigarettes per day , Increased bone density either locally or generally (eg Paget's disease and osteopetrosis), Previous history of dry sockets following extractions [4]. Nitzan et al. (1983) proposed, in particular, the role for anaerobic bacteria, especially Treponema denticola, which showed plasminlike fibrinolytic activity in vitro. Although bacteria may play a role, no direct cause–effect relationship has been demonstrated between bacteria and dry socket [5]. Birn suggested that the etiology of AO is due to heightened local fibrinolysis which results in disintegration of the clot. The fibrinolysis can be accomplished via direct (physiologic) plasminogen pathway activation or indirect (nonphysiologic) activator substances. Direct activators are released after trauma to the alveolar bone cells. Indirect activators are expanded by bacteria. The fibrinolytic activity is local because initial absorption of plasminogen into the clot limits the activity of plasmin[6].

Any treatment modality for dry socket is considered effective if it improves patient’s quality of life by reducing cost of therapy and relieving patient's pain. Copious irrigation of extraction socket with warm saline or dilute hydrogen peroxide and dressing with obtundant medicament has become the established in the treatment of dry socket but it has its shortcomings of long duration with frequent visit by patient for the completion of treatment.

Various treatment options are available for dry socket are topical application of a combination of eugenol, benzocain and balsam of Peru [7]. Iodoform and Butylparaminobenzoate [8] and

Prophylactic administration of systemic beta lactamase inhibitor containing antibiotic have been claimed in reducing incidence of dry socket.[9].

This study documents newer approach to the management of dry socket using honey abstract and compared it with the traditional method along with review of literature.

METHODOLOGY

Total seventy patients of clinically diagnosed dry socket were recruited in the study. The diagnostic criteria for dry socket was based on history of extraction of two or more days and pain, clinical examination for sensitivity on gentle probing the extraction socket, trismus, halitosis and condition of tooth socket i.e bare bone , loss of blood clot [Figure 1] . Patients with systemic diseases like diabetes mellitus, hepatic dysfunctions, blood dyscrasias, bleeding disorders, previous use of systemic antibiotics for dry socket, previous treatment for dry socket and history of all kinds of tobacco use were excluded from the study. The pros and cons related to the treatment were explained to the patient and informed consent was taken thereafter.

All the sockets was irrigated with 1:4 diluted hydrogen peroxide followed by 20 ml saline.

In experimental group 2 ml of honey extract was applied in the socket & was covered with 1 inch folded sterile gauze. In control group Zinc Oxide Eugenol (ZOE) in cotton piece of comparable size with that of socket was put loosely into socket and covered with 1 inch folded sterile gauze. Following parameters were assessed on follow up visit clinically i.e pain, swelling and redness , formation of granulation tissue in socket. Visual Analogue Scale (VAS) was used to measure the intensity of pain. According to this scale patients measured their pain from out of three i.e. mild(1-4) , moderate(5-7) and severe pain(8-10) . Sensitivity on gentle probing the extraction socket was considered on all or none basis. All the patient were followed up every alternate day i.e 1,3,5,7,9,11,13,15th day for pain assessment and 5, 10, 15, 20, 25 day for granulation tissue formation and subsequent healing of socket. [Figure 2,3]

RESULT: 24 subjects were male while 16 subjects were females in Honey group. While in ZOE group 14 were male and 16 were females. Honey reduces the pain intensity in experimental group as compared to control group but the result was statistically not significant (p> 0.05.) ZOE groups shows pain scale of 6.0, 5.2, 5.0, 4.8, 4.0, 3.2, 3.0, 2.0 and Honey group shows 5.0, 4.0, 3.0, 2.5,

1.8, 1.2, 1, 1 on day 1st, 3rd, 5th, 7th, 9th, 11th, 13th and, 15th respectively. [Table 1]

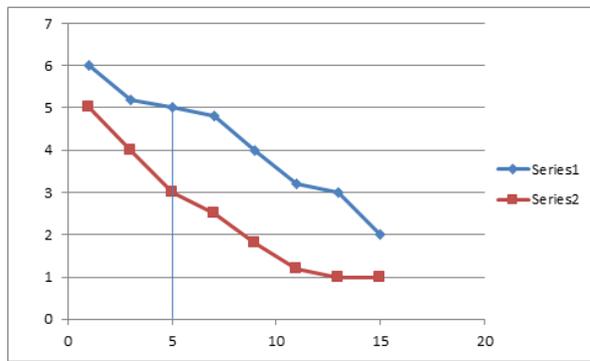


Table 1.(X axis- VAS scale) & (Y axis- days) : Shows alternate day wise(1st, 3rd, 5th, 7th, 9th, 11th, 13th and, 15th) average pain intensity comparison between two groups. Series 1 (ZOE group) and series 2 (Honey groups)

Healthy granulation tissue formation in honey group was noted from 5th day in 75% cases and in 25% cases granulation tissue appeared on 7th day while in ZOE group granulation formation was noted from 8th day in 60 % cases and 10th day in 40 % cases. Formation of granulation tissue and resultant healing of socket was enhanced in honey group than ZOE group and result was statistically significant(p< 0.05). Other clinical parameters like swelling, redness, halitosis, trismus were also lower in honey group as compared to ZOE group though result was statistically insignificant. Two cases (6.6%) showed increased severity of trismus in control group and One case in honey group developed systemic signs like fever, lymphadenopathy which required antibiotics course. One case(2.5%) in honey group showed increased exudation in the first week followed by normal healing.



Figure 1. Dry Socket

Figure 2. Application of Honey Extract

Figure 3. Healing of socket

Discussion:

The occurrences of dry socket is common during dentoalveolar surgeries. It occurs during the healing phase of extraction sockets, also considered as most common post extraction complication. Dry socket results in delayed wound healing of extraction socket and its etiology is absolutely not clear. It is believed that it occurs due to high level of fibrinolytic activity in extraction socket resulting in lysis of blood clot resulting in exposure of bone. The pain of Dry socket occurs because of release of kinins which are immediately available following tissue trauma, exposure of nerve endings to air, food and fluids in bare bone of the extraction socket and infectious process which releases tissue activators and pain mediators. Dry socket was more common in mandible than maxilla because of more vascularisation of maxilla than mandible. Also molars are more involved because their socket has wider circumference hence resultant larger blood clot than other teeth which probably exposed the blood clot to more fibrinolytic activity.

Management of dry socket is less controversial than its etiology and prevention. The traditional method aimed at pain control until commencement of normal healing. There is no need of systemic antibiotics for treating dry socket. It is superficial inflammation merely of cortical plate of the extraction socket, hence topical anesthetic/analgesic/antiseptic will be enough e.g. Alvogyl or Chlorhexidine and if needed systemic analgesics can also be given

for controlling pain. Surgical intervention should never be done unless indicated for other problems e.g. retained root. Reassurance must be given to the patient about the problem. Various medicaments have been tried in the form of socket dressings like ZnOE, iodoform, mertronidazole, chlorhexidine and systemic antibiotics with varying degree of success. Platelet rich plasma gel has also been tried to promote healing in dry socket.

Although very well known as a food, honey is not well recognised as a medicine, yet it is one of the oldest medicines known and has continued to be used as such throughout the ages. However, it has been “rediscovered” in more recent times by the medical profession [10], and the large volume of literature appearing in the effectiveness of honey in treating wounds and skin ulcers describes features that indicate that honey has a potential for the therapy of periodontal diseases, mouth ulcers and other healing problems of oral health. Honey is one of the many therapeutic agents which is a carbohydrate-rich syrup produced by bees from floral nectar. Honey is a nectar collected by bees from a wide variety of plants that is concentrated by evaporation of water to form a saturated or supersaturated solution of sugars, consisting typically of 17% water, 38% fructose, 31% glucose, 10% other sugars, and a wide range of micronutrients (vitamins, amino acids and minerals), with a pH below 4 (White 1975). [11] Recent studies have shown that honey is useful as a dressing on infected or non-infected wounds. It is antibacterial, anti-inflammatory and odorless. It helps in granulation and epithelialization, shedding of necrotic tissue and has an analgesic and antioxidant effect [12]. Honey helps to keep the wound moist, in addition it stimulates white blood cells to produce cytokines, particularly interleukin-1, interleukin-6 and tumor necrosis factor. Honey also helps to speed up the healing process and reduces scarring [13]. Honey makes bacteria inactive by dehydrating it owing to its hygroscopic property. The potassium extracts moisture from the bacteria. Aluminium sulphate and sucrose present in honey also accelerates normal healing process [14] “Elbagoury et al” in 1985, demonstrated the analgesic property of honey in their study. He used honey as a dressing material after surgical removal of impacted third molars and it resulted in less pain. Incidence of postoperative complications and swelling in honey treated group were found to be less than in the control group [15].

The antibacterial activity of honey has been known for almost as long as bacteria have been known to be the cause of infection, and the large amount of published research over the years revealing the broad spectrum of action and the potency of this activity has been comprehensively reviewed (Molan 1992a) [16]. Although honey has been found useful against a large number of microorganisms but its clinical effectiveness is still questionable in many cases owing to the failure to take into consideration the extent in potency of activity of honey. Nowadays standardised honeys are selected in recent studies which are thought to be close to the median level of activity found in a survey of a large number of samples of commercially produced honey. These have proved the efficiency of the activity of honey against infective bacteria to be acceptable to be likely to be useful clinically.

In one study with 20 isolates of *Pseudomonas* from infected wounds (Cooper and Molan 1999) [17]. The minimum inhibitory concentration of honey was found to range from 5.5% to 9.0%. In another with 58 clinical isolates of *Staphylococcus aureus* the minimum inhibitory concentration of honey was found to range from 2% to 4% (v/v). Antibiotic-resistant strains of bacteria (MRSA and VRE) have been found to be just as sensitive to honey as the antibiotic-sensitive strains of the same species (Cooper et al. 2000) [18], and there have been clinical reports of wounds infected with MRSA being cleared of infection and healed by application of honey (Betts and Molan 2001; Dunford et al. 2000; Natarajan et al. 2001) [19,20,21]. It is probably the very effective anti-inflammatory activity of honey that is responsible for the minimisation of scarring by honey dressings on wounds, although it may also be the antioxidants in honey removing free radicals that is involved. Honey has a direct anti-inflammatory effect, not a secondary effect resulting from the antibacterial action removing

inflammation-causing bacteria. The anti-inflammatory effects of honey have been demonstrated in histological studies of experimental wounds in animals where there was no infection involved (Burlando 1978, Kandil *et al.* 1987, El-Banby *et al.* 1989, Gupta *et al.* 1992, Postmes *et al.* 1997, Oryan and Zaker 1998). A direct demonstration has been reported to prove the anti-inflammatory properties of honey where honey reduced the stiffness of inflamed wrist joints of guinea pigs (Church 1954). It was also found that honey has a compelling antioxidant content (Frankel *et al.* 1998), measured due to its capacity of scavenging free radicals. The inhibition of chemiluminescence in a xanthine oxidase-luminol system that works via generation of superoxide radicals demonstrates the antioxidant activity of honey (Ali and Al-Swayeh 1997). The formation of free radicals from hydrogen peroxide through the Fenton reaction is also prevented as it also segregates iron (Buntting 2001). But its rapid antibacterial activity would also play a vital role which stimulates an inflammatory response. t.[22]

Recent research indicates that honey may in addition to its antimicrobial activity clear infection also through stimulating the activity of leukocytes. Cell culture studies have shown that low concentration of honey stimulates proliferation of lymphocytes and activates phagocytes (Abuharfeil, Al-Oran, and Abo-Shehadeh 1999) [23], and stimulates monocytes to release cytokines which are activators of the immune response to infection (Tonks *et al.* 2001) [24]. Also honey carries glucose which is important for the 'respiratory burst' in macrophages and that is an essential part of their mechanism involved in wrecking bacteria.

Additionally, honey is a substrate for glycolysis, the major mechanism of energy production in macrophages. Oral conditions like radiation-induced mucocitis and others after radiotherapy and chemotherapy of cancer could also be relieved by honey due to its anti-inflammatory action and stimulating effect on tissue repair. There are publications which state decreased inflammation when honey is applied on thermal burns to the skin, and anecdotal reports suggest that radiation burns to the skin after radiotherapy are reduced after honey application to the skin due to its anti-inflammatory activity. There has also been a published report on using honey to ease the pain of stomatitis during radiotherapy (Chiba *et al.* 1985) [25]. The stimulatory action of honey on the growth of granulation tissue and epithelial cells would also be of benefit in hastening the repair of damaged tissues.

It has been observed that honey clears infection, removes malodour, reduces inflammation and pain, causes oedema and exudation to subside, and increases the rate of healing by stimulation of angiogenesis, granulation and epithelialisation. Many of these factors can be expected to be secondary to the clearance of infection, since this causes an inflammatory response which in turn causes pain, edema, exudation and a slowing or cessation of healing process. However they have been observed in also in experimental wounds in animals where no infection was involved. Nevertheless, the rapid clearance of infection is the most notable feature of honey as wound dressing, in many cases it clearing infection where no conventional therapy had worked. And unlike other antiseptics, honey is not cytotoxic so it does not slow healing, nor does it have any adverse side effects like antibiotics do. Dry socket is a self-limiting condition, the cause of which remains elusive. The main goal of Management is to alleviate the pain of patient until the socket is healed. Wound is protected from food debris and microorganisms which results in accelerated healing. The limitation of our study was the small sample size and also it only measured the clinical aspects of socket healing. Other parameters of socket healing, e.g. hard tissue healing and average bone loss is recommended. Also only one examiner performed the measurements and there was no intra-examiners reliability.

Conclusion:

Based on the result of our study we conclude that honey reduces the pain severity, enhances the soft tissue healing in dry socket. Honey can be used as an alternative to traditional medicaments used. Many oral health care providers have a mind set that only

medicines are relevant in management of oral diseases. There is a lack of well controlled research on this topic and further research is recommended to clarify the ambiguity. It is essential to provide scientific evidence of usefulness of this new and alternate products & also to increase recognition of novel forms of cure.

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