

A systematic review of Therapeutic benefits of honey in treating alveolar osteitis

Deepashri H Kambalimath¹, Dr Mamta Singh²

From,^{1,2} Reader, Department of Oral and Maxillofacial Surgery, ¹College of Dental Sciences, Davangere, ²Index Institute of Dental Sciences, Indore, India.

Correspondence to: Dr Deepashri H Kambalimath, Department of Oral and Maxillofacial Surgery, College of Dental Sciences, Davangere, India. Email ID: dkambalimath@yahoo.com

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ABSTRACT

A major complication that follows extraction of tooth/teeth in Oral Surgery is Dry socket. The various treatment modalities for alveolar osteitis namely, antibacterial dressings, obtundent dressings such as zinc-oxide eugenol, topical anesthetic dressing and combinations are used. Since ancient times honey has been used in folk medicine and has more recently been rediscovered by medical researchers for its use in dressing acute and chronic wounds. It also halts advancing necrosis. Hence honey can be considered in the management of dry socket. A computerized literature of medical databases search using Pubmed/Medline/NIH (1966 to 2015), Embase (1980 to 2015), Science direct (2015) and the Cochrane Library (1999-2015) was done. Although several publications have mentioned the use of honey in various procedures mainly for burns, ulcers, boils, pilonidal sinus, venous bed sores and diabetic foot ulcers, only one article mentioned the use of honey as the treatment for alveolar osteitis. The rejuvenation of interest in honey as a modern wound dressing offers an additional tool for both patients and clinicians in managing dry socket. Continued research is needed to increase our understanding about the role of honey in a variety of wounds and its effect on healing compared to other treatment modalities.

Key words: Honey, alveolar osteitis, therapeutic agent, antibacterial properties.

A major complication that follows extraction of tooth/teeth in Oral Surgery is Dry socket, also referred to as alveolar or fibrinolytic osteitis [1]. A standardized definition that can be used universally for alveolar osteitis is as “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” [2]. It is an acute inflammation of the alveolar bone around the extracted tooth and it is characterized by severe pain, breakdown of the clot formed within the socket making the socket empty (devoid of clot), and often filled with food debris [3]. There is mild swelling and redness of the gingival, halitosis, bone exposure, and severe tenderness on examination. Occasionally regional lymphadenopathy also has been noted. It is thought to be of multi factorial in origin and many etiological aggravating and precipitating

factors. Various reasons have been reported in literature which are responsible for the occurrence of dry socket; these include pre-and postoperative infection at the site, smoking, oral contraceptives, bone disorders, traumatic, difficult and prolonged extraction, and underlying pathologies, irradiation, systemic illness such as diabetes mellitus, clotting problems, and failure to comply with postextraction instructions, history of dry socket and periodontal diseases [4-7].

There are various treatment modalities for alveolar osteitis like antibacterial dressings, obtundent dressings such as zinc-oxide eugenol, topical anesthetic dressing and combinations of these. Since ancient times honey has been used in folk medicine and has more recently been rediscovered by medical researchers for its use in dressing acute and chronic wounds. Traditionally, honey has been used to treat burns, infected and non-healing wounds and ulcers, boils, pilonidal sinus, venous and diabetic foot ulcers [8-13]. It has also been reported that honey dressing

halt advancing necrosis. Hence honey can be considered in the management of dry socket.

The purpose of this review is to accentuate the wide-ranging therapeutic advantages that honey can offer in alveolar osteitis using examples from the literature.

METHOD

A computerized literature of medical databases search using Pubmed/Medline/NIH (1966 to 2015), Embase (1980 to 2015), Science direct (2015) and the Cochrane Library (1999-2015) was done. Mesh phrases used in the search were: dry socket, alveolar osteitis, honey, medicinal properties, anti-bacterial properties for randomized controlled trials using honey for alveolar osteitis accessed on July 2015. The only inclusion criteria was to review published reports, abstracts and studies with clinical cases to determine the relative benefits of honey

and its therapeutic usage in alveolar osteitis. The search was limited to English articles only. As this study included only the online database search and review of published data, it was exempt from Institutional Ethics Committee approval.

RESULTS

Relevant data was extracted and tabulated (Table 1). Only one article mentioned the use of honey as the treatment for alveolar osteitis. In literature there are several publications which mentioned the use of honey in various procedures mainly for burns, ulcers, boils, pilonidal sinus, venous bed sores and diabetic foot ulcers. The literature regarding usage of honey for alveolar osteitis is negligible. Conclusions were drawn and discussed based on the reviewed literature with emphasis on the therapeutic advantages on honey in the treatment of alveolar osteitis.

Table : Systemic review in various search engines

Sl. no.	Search engines [last reviewed till July 2015]	Key words		
		Honey	Honey + Antibacterial activity	Honey + Antibacterial activity +Alveolar osteitis
1.	Pubmed/Medline/NIH	13610	1076	8 (1- use of honey)
2.	Cochrane library	8705	8705	0
3.	Science direct	55,751	3,771	0
4.	Scholars journal	681	3738	7576 (1-use of honey)

DISCUSSION

Folk medicine (also known as indigenous or traditional medicine) comprises the knowledge that has been developed over generations within various societies before the era of modern medicine. Traditional medicines include practices all over the globe like Herbal, Ayurveda, Siddha, Unani, Iranian, Islamic, Vietnamese, Chinese, Acupuncture, Muti, Ifá, African and other pseudo-medical knowledge[14]. The World Health Organization (WHO) defines traditional medicine as “it is the sum total of the knowledge, skills and practices, based on the theories, beliefs and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health, as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness. The terms complementary/ alternative/ non-conventional medicines are used interchangeably with traditional medicine in some countries”[15].

Honey has been used in folk medicine since ancient times and has more recently been rediscovered by medical researchers for its use in dressing acute and chronic wounds. The first documentation of the use of honey in wound management was by the Egyptians in 2000 BC

[16]. Honey has been described as the nectar of life in Ayurvedic medicine and has been used widely to treat various diseases [17]. In the Bible, the Quran and the Torah they have described the medicinal property of honey [18, 19]. There are documented results of use of honey in burns in the early 20th century and have confirmed the advantages of using this natural remedy for wounds [20-21]. Due to the advent of antibiotics and other surgical procedures, the Western medicines have replaced the use of honey [22]. On contrary due to the widespread use of antibiotics, resistance to various antibiotics has been developed and many multi-resistant micro-organisms have emerged. Introduction of newer antibiotics has decreased, hence the emergence of alternative or traditional medicine has reborn. Consequently, the interest of using honey for wound management is re-initiated [14].

Honey is derived from nectar gathered and modified by the honeybee. It is a carbohydrate-rich syrup derived from floral and other plants nectars and secretions. It is made up of approximately 40% fructose, 30% glucose, 5% sucrose and 20% water, several amino acids, antioxidants, vitamins, minerals, glucose oxidase. All of these produces hydrogen peroxide and gluconic acid, which makes the honey acidic with pH of 3.2-4.5 [23, 24]. Honey has to be

heated to eradicate the spores, and this takes place under 120 degrees centigrade temperature for 10 minutes. However, this can alter some of honeys' beneficial properties. Glucose oxidase is not heat resistance. Therefore, gamma irradiation is introduced to destroy occasionally seen spores in honey, while having no adverse impacts on honey's beneficial properties [25]. Clostridium botulinum do survive in honey, thus a risk of botulism or gangrene [25-27] so it is advocated to sterilize the honey using gamma irradiation at a dose of 25-50 kGy [26].

Anti-inflammatory effects of honey benefits wound healing. The amount of wound exudates is due to the local inflammatory process around the wound. Therefore, the anti-inflammatory action of honey reduces edema and exudates, which can subsequently improve wound healing. This effect also reduces pain caused by pressure on nerve endings and reduces the amount of prostaglandin produced in inflammatory process of dry socket [25]. The anti-inflammatory effects of honey have been observed in animal models as well in clinical settings [28]. Honey's anti-inflammatory action and stimulatory effects on granulation and epithelialization, help in rapidly reducing pain and edema [29,30]. Honey also stimulates the angiogenesis, granulation and epithelialization, by producing certain growth factors like Tumor Necrosis Factor (TNF-alpha) which helps speed up the healing process [28, 31]. The anti-inflammatory activity of honey can eliminate this obstacle to healing. Hence a clean indication, as a therapeutic agent for the dry socket.

The antibacterial activity of honey works by removing infectious bacteria stimulating the inflammatory response. Highly viscous nature of the honey, is the unique property helps in delivering a moist environment in healing [32]. Hygroscopic nature of honey, draws moisture out of the environment and dehydrates the bacteria with the aid of its hyperosmolar properties (honey is high in sugar) [28]. It provides wound deodorization and rapid autolytic debridement [14,19,22,29,30,33]. Honey also has been found to be effective in vitro against a range of multi-resistant organisms including methicillin-resistant Staphylococcus aureus (MRSA), vancomycin-resistant Enterococci (VRE), and other multi-resistant Gram-negative organisms including Pseudomonas aeruginosa [34]. Honey has debriding action which helps to reduce the sources of bacteria and hence prevent further inflammatory reactions [25]. Honey contains both aqueous and lipophilic antioxidants which enable it to act at different cellular levels as an ideal natural antioxidant [35]. This activity decreases the cellular damage caused by free radicals by protecting the antioxidant enzymes and decreasing the oxidative stress, thus decreasing the inflammatory process [36]. Honey has the inherent capability to increase the formation of granulation tissue, stimulate tissue growth, and reduce edema, inflammation and the synthesis of

collagen, halt advancing necrosis which are much necessary factors for healing of an alveolar osteitis [24, 28]. Honey is said to form a barrier which helps the wound from getting infected. The antibacterial properties of honey prevent bacterial colonization [16-26]. These are clean indication of anti-inflammatory action hence can be used as a therapeutic agent for alveolar osteitis.

There are various pharmacological interventions are available in the treatment of alveolar osteitis. They are antibacterial agents, obtundent dressings, topical anesthetic dressings and combinations. To date, no scientific studies have been carried out that specifically investigate the incidence of potential side effects and tissue damage arising from the placement of intra-alveolar dressings. Although a theoretical potential for the development of resistant bacterial strains with intra-alveolar antibiotic use has been reported [37]. It is generally acknowledged that dressings delay the healing of the extraction socket [2]. A chlorhexidine gel (1% and 0.2%) has also been used for the treatment but cost of it is expensive [38]. Excessive use of eugenol also leads to necrosis of bone [24]. The use of Plasma rich growth factor (PRGF) along with gelatin sponge has also been advocated as a treatment option for alveolar osteitis [39]. It significantly enhances the healing of dry socket by increasing tissue vascularity through increased angiogenesis, chemotaxis of macrophages and fibroblasts, increased granulation tissue production and epithelialization, enhanced osteogenesis. These might also have antimicrobial effect and provide with an immediate surgical hemostatic agent that is biocompatible, effective and safe [39], need for additional blood for PRGF formation is a major disadvantage. Despite all the research and development it is still posing a challenge in terms of delayed healing and frequent visits along with mental distress of the patients.

CONCLUSION

The wheel has turned full circle and honey is being re-established as a valuable agent in modern wound care management. The rejuvenation of interest in honey as a modern wound dressing offers an additional tool for both patients and clinicians in managing dry socket. Recent additions of the honey product range of dressings indicate commercial confidence in the future of therapeutic honey. Its advantages— providing a moist environment, debriding, de-odorizing, antibacterial, anti-inflammatory capabilities are factors that have been shown to facilitate healing particularly in treating alveolar osteitis. Continued research is needed to increase our understanding about the role of honey in a variety of wounds and its effect on healing compared to other treatment modalities. During the systemic review we found that only one study has been published about the use of honey in the management of alveolar osteitis. However, further investigations and well controlled studies are necessary to draw firm conclusions

which can lead to increased clarity regarding the most beneficial management of dry socket using honey.

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