

MINI REVIEW

Medicine Science 2021;10(1):268-70

Bee.... my honey, you are now my first love” – A whimsical review

 Amit Kumar C Jain

Amit Jain's Diabetic Foot and Wound Research Unit, Amit Jain's Institute of Diabetic Foot and Wound Care, Brindhavvan Areion Hospital, Bengaluru, India
Department of Surgery, Raja Rajeswari Medical college, Bengaluru, India

Received 12 September 2020; Accepted 01 November 2020
Available online 17.01.2021 with doi: 10.5455/medscience.2020.09.185

Copyright@Author(s) - Available online at www.medicinescience.org
Content of this journal is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.



Abstract

Honey is a natural therapeutic agent with many health-related benefits. Used in ancient era, it has found its place in modern wound care in view of its antimicrobial properties. Effective for different types of wounds, medical grade honey places an essential role in biofilms management and in cases of multidrug resistant bacterial infection. After knowing its properties, this agent is increasingly being used in different parts of the world by wound care experts to promote wound healing and sterilize the wound. This article aims to describe honey in a whimsical manner highlighting its properties.

Keywords: Diabetic foot, honey, wounds

Introduction

Honey, which is considered to be the nectar of the gods, is a wonder of nature [1, 2]. The nutritional and health benefit of it has been described since ages [3]. This sweet, flavorful nectar is gathered by bees from plants and is stored in the honey combs' [2, 4, 5]. The nectar is converted to honey by bees through process of regurgitation and evaporation and this is stored in bee hive [6]. Using honey and other bee products is known as Apitherapy [5].

History

Use of honey has been long in human history [7]. The humans started hunting honey around 8000 years ago [8]. The honey was first mentioned in wounds in ancient Egypt between 2600-2200 BC [9]. The healing properties of this golden yellow liquid have been found in Bible, Vedas, Quran and the Torah [6, 10]. The ancient Egyptians, Greeks and Romans employed honey for wounds and intestine problems [11]. Honey was used for embalming the dead in ancient Egypt [11]. In ancient India, the Vedic civilization also acknowledged honey to be a beneficial gift of nature [11]. In Ayurvedic scriptures, honey was called Madhu [6]. The honey

was classified into 2 types namely, Navina Madhu, which is the fresh honey and the Purana Madhu, which is the old honey [6]. Hippocrates also observed that honey could clean sores and ulcers of lips [12]. Babylonians used honey for eye and ear infections whereas Greeks used honey to treat fatigue [12].

Honey Composition

Honey is made up of sugars, water and contains various proteins and vitamins like B complexes and vitamin C along with minerals like Zinc, Calcium, etc [13]. Natural honey is believed to have more than 300 constituents [4].

The sugar content in honey could be as high as 80-90% with fructose and glucose being the main sugars [5, 12]. The water content in honey is less than 20% [14]. The PH of honey is between 3.4 - 6.1 and there are about 30 organic acids in honey with gluconic acid being most common and it ranges from 0.23-0.98% [12, 14]. Honey has around 18 amino acids and more than 600 volatile organic compounds like ketones, aldehydes, etc [12].

Types of Honey and Honey Bees

There are different types of bees like honey bee, stingless bee, nectarina wasps, etc [12]. In South Asia and countries like India, honey is obtained from Apis species [11, 15]. In India, more than 90% of honey is believed to be from Apis dorsata [16].

Based on the source of nectar, honey could be floral and non-floral honeys. Honey can also be unifloral or multifloral depending

*Corresponding Author: Amit Kumar C Jain, Amit Jains Institute of Diabetic foot and Wound Care Brindhavvan Areion Hospital, Bengaluru, India
E-mail: dramitkumarj@yahoo.in

whether it is collected from same flower or different type of flower [5]. Non-floral honeys are obtained from fruits, tissues of plants or from excretions of insects (Aphids) [5]. The honey obtained from plant sucking Insects (Aphids) is called Forest honey/honey dew [4, 12].

The floral honey or blossom honey is obtained from nectars and are also called nectar honeys [4]. A bee hive has 3 honeybee caste namely the Queen (Alpha), the Worker (Beta) and drone (Gamma). The worker bees travel up to 9km to obtain this nectar [12].

HONEY IN WOUNDS

As one of the experts in diabetic foot and wound care, we often use medical grade honey in wounds. Medical grade honeys are those which are gamma irradiated [17]. Gamma irradiation sterilizes the honey effectively and does not alter its physico-chemical properties [18].

Different honeys are used with success in different parts of the world and they include manuka, gelan, tulang honey, etc [19]. There are different studies from different countries like Egypt, India, Nigeria, Saudi Arabia, etc that have shown the effectiveness of those honey [20]. We use medical grade Indian honey obtained from giant Coombs of *Apis dorsata* [21] at our Institute (Figure 1).



Figure 1. Gamma irradiated Indian honey from *Apis* species used at our institute. It is applied on sterile gauge which is then placed on the wounds

The antimicrobial activity of honey in modern medicine was first recognized by Van Ketel in 1892 [11]. Honey has both bacteriostatic and bactericidal activity and its antibacterial activity can be up to hundred folds [20, 21].

Honey inhibits around 60 species of bacteria including resistant strains apart from being fungicidal [11, 17]. The organism's sensitive to honey include staphylococcus pseudomonas, streptococcus, salmonella, klebsiella, etc [9, 11, 17].

The antimicrobial properties of honey are due to its hygroscopic effect from its high sugar, due to its low PH as acidity inhibits growth of most organism, hydrogen peroxide and several phytochemical factors [9, 11]. It is known that apart from hydrogen peroxide, the flavonoids like Pinocembrin, Pinobanksin and Chrysin along with phenolic acids are also antimicrobial/Inhibines in nature [8]. Hydrogen peroxide (concentration low) being a main antimicrobial, is known to cause oxidative damage that leads to bacterial growth inhibition and DNA degradation [12].

It is known that wound treated with honey are rendered sterile in 7-10 days of starting the treatment and it promotes healthy granulation tissue [22]. However, when one uses medical grade honey topically, it is better to be applied on the gauze first which is then placed on the wound and then pads are placed over it [21]. One should not apply honey directly on exudating wounds as it can be washed away by exudate [23].

Honey has been used in various different acute and chronic wounds and has found to be very effective. These wounds include diabetic foot ulcers, venous ulcers and pressure ulcers that are often seen in extremities [9]. Studies have shown that when honey is used in venous leg ulcers, it reduced pain and wound size [20]. A study by Othman et al showed that honey leads to wound healing and decrease amputations in diabetic foot ulcers [24]. Other sites where honey is also used is sacral wounds and in head and neck wounds [9, 19]. Honey was found protective in radiation induced mucositis in head and neck cancers [9]. Honey is also used in burns [14, 19]. Honey is also used in malodorous malignant wounds [23]. Some studies also found honey to be effective in mouth ulcers [23].

Studies have been done comparing honey with different antimicrobial agents like nitrofurazone and povidone iodine wherein honey was found to be better or as effective as these agents [20]. A study from north India showed honey to be better than povidone dressings in terms of healing, allergy, reduction in amputation and hospital stay [25].

At our institute, we have used honey commonly for extremity wounds especially in diabetic wounds, frequently in situation where there are persistent biofilms that were not controlled with other antimicrobial agents. After seeing its good results, it has now become our first preference that led us to open a new eponymous wing in the year 2020 within our Institute, that is known as "Amit Jain's Centre for Apitherapy" wherein we started using gamma irradiated honey on most wounds where biofilms are not irradiated easily and also in non-healing wounds. This unique Centre on apitherapy will treat wounds with honey and it also aims in teaching, propagating benefits of honey on wounds and publishing research work on honey. In one of our recent publication [21], we showed honey to be effective in moisture associated skin damage especially when there is high exudate as honey has good anti-inflammatory properties [9].

The side effects and resistance to honey is rare though it can cause stinging sensation [13]. We too noticed in a few patients, especially those who don't have neuropathy, to complaint of stinging sensation in first one or 2 sittings of honey after which they don't complaint. Another important issue we noticed is the presence of red ants in one of our case This can happen where the padding is inadequate or the external surface of the dressing is touched by gloves or instrument having honey remnants. We started using lot of pads and also, we change our gloves and segregate the honey laden instrument after applying honey from the sterile pads which are applied only after changing the gloves. Even the person handling the honey is strictly advised not touch any surface on dressing trolley till gloves are disposed to avoid red ants. We store our honey in double containers too.

A caution has been often advised when using unsterile honey as it can contain yeast and bacteria in it. Even spores of bacteria are found in it [22]. It is better to sterilize it with gamma irradiation before considering it to be used on wounds. We sterilized our honey with 15 kGy gamma irradiation (cobalt 60) and post sterilization, the honey was re-cultured and it found to have no growth after which we use the honey on wounds [21].

Honey is also used along with alginates and hydro fiber dressings [23].

Conclusion

Honey is a natural therapeutic agent with many health benefits. Its role in wound care is well established and is used frequently in different parts of the world. With broad spectrum antimicrobial activity along with anti-inflammatory action, it sterilizes wound and promotes wound healing. With many benefits of this god's nectar, there is no doubt that honey is now my first love in wound care with other wound care products being second choice, especially when there is multi-resistant bacterial infection and in biofilms.

Conflict of interests

The authors declare that they have no competing interests.

Financial Disclosure

The financial support no have.

References

- White E. Honey: Antimicrobial and antibacterial nectar of the gods. Wounds UK 2019;15:70.
- Kumar KPS, Bhowmic D, Chiranjib, et al. Medicinal uses and health benefits of honey: An overview. J Chem Pharm Res. 2010;2:385-95.
- Samarghandian S, Farkhondeh T, Samini F. Honey and health: A review of recent clinical research. Pharmacognosy Res. 2017;9:121-7.
- Ajibola A. Novel insights into the health importance of natural honey. Malays J Med Sci. 2015;22:7-22.
- Manu-Loh CE, Clarke AM, Ndip RN. An overview of honey: Therapeutic properties and contribution in nutrition and human health. Afr J Microbiol Res. 2011;5:844-52.
- Arawwawala LDAM, Hewageegana HGSP. Health benefits and traditional uses of honey: A review. J Apither. 2017;2:9-14.
- Meo SA, Al -Asiri SA, Mahesar AL. Role of honey in modern medicine. Saudi J Bio Sci. 2017;24:975-8.
- Xaidi MZ, Sharma J. Honey and its beneficial therapeutic effects: A review. J Pharm Phytochem. 2019;8:1056-61.
- Song JJ, Salcido R. Use of honey in wound care: An update. Adv Skin Wound Care. 2011;24:40-4.
- Bangaroo AK, Khatri R, Chauhan S. Honey dressing in Pediatric burns. J Indian Assoc Pediatr Surg. 2005;10:172-5.
- Eteraf-Oskouei T, Najafi M. Traditional and modern uses of natural honey in human diseases: A review. Iran J Basic Med Sci. 2013;16:731-42.
- Saranraj P, Sivasakthi S. Comprehensive review on honey: biochemical and Medicinal properties. JAIR. 2018;69:165-81.
- Nanda MS, Mittal SP, Gupta V. Role of honey as adjuvant therapy in patients with sore throat. Natl J Physiol Pharm Pharmacol. 2017;7:412-5.
- Cooper R. Honey as an effective antimicrobial treatment for chronic wounds: Is there a place for it in modern medicine. Chronic Wound Care Management Res. 2014;1:15-22.
- Nagir MT, Atmowidi T, Kohono S. The distribution and nest site preference of *Apis dorsata binghami* at Maros forest, South Sulawesi, Indonesia. J Insect Biodiversity. 2016;4:1-14.
- Basavarajappa S, Raghunandan KS, Hegde SN. Physico-biochemical analysis of multifloral honey of *Apis Dorsata* Fab. (Hymenoptera: Apidae) in southern Karnataka, India. Current Biotica. 2011 5:144-56.
- Cooper R. The use of honey in diabetic foot ulcers. Diabetic Foot J. 2017;20:154-9.
- Bera A, Almeida-muradian LB, Sabato SF. Effect of gamma radiation of honey quality control. Radiation Physics Chemistry. 2009;78:583-4.
- Yaghoobi R, Kazerouni A, Kazerouni O. Evidence for clinical use of honey in wound healing as an antibacterial, anti-inflammatory, antioxidant and antiviral agent: A review. Jundishapur J Natural Pharmaceutical Products. 2013;8:100-4.
- Alam F, Islam MA, Gan SH, et al. Honey: A potential therapeutic agent for managing diabetic wounds. Evidence Based Complementary and Alternative Medicine. 2014;169130.
- Jain AKC, Apoorva HC. Medical grade Indian honey is an effective agent in moisture associated skin damage. SAR J Med Case Rep. 2020; 1:21-5.
- Singh MP, Chourasia HR, Agrawal M et al. Honey as complementary medicine- a review. Int J Pharma Bio Sci. 2012;3:12-31.
- Simon A, Traynor K, Santos K et al. Medical honey for wound care- still the "Latest Resort". Evid Based Complement Alternat Med. 2009;6:165-73.
- Othman AA, Balila RMH, Mahdi SI, et al. Healing potential of propolis and bee's honey on diabetic foot ulcers in Jabir Abu Eliz Diabetic Centre-Khartoum. Sudan Med J. 2016;52:81-4.
- Yadav AK, Dwivedi S, Desai S. A comparative study in between tropical honey and povidone dressing in diabetic wounds in a medical college of Northern India. Int Surg J. 2018;5:3391-3.