

Promoting Evidence-Based Nursing Practice in WOUND MANAGEMENT

REVIEWING THE USE OF HONEY ON WOUNDS

Introduction

Honey has been applied to wounds for over 4000 years². In more recent times, the healing properties of honey have been investigated using scientific methods and there are many published studies and reports on the beneficial properties of honey in the treatment of wounds.

Honey has been used to treat a wide range of conditions including skin, eye, ear, respiratory and gastrointestinal problems¹⁸.

What is Honey?

Honey is produced by bees from floral nectar. It is a saturated solution of sugars and consists of 84% mixture of fructose and glucose. Honey has low water content: (15-21% by weight) and is acidic (pH 3.2 - 4.5)⁶.

Claims

The literature claims that honey has the following effects on wounds:

- Antibacterial activity
- Anti-inflammatory action
- Stimulation of angiogenesis
- Stimulation of granulation tissue
- Deodorising effect
- Debriding action
- Scarring reduction

Antibacterial Activity

The antibacterial activity of honey is supported by a number of studies³ which claim inhibition of major bacteria groups occurs at honey concentrations between 1.8% - 11%¹⁷.

It is believed that the high osmolarity of honey^{1,5} contributes to the antibacterial activity. This is due to the strong interaction of sugar with water, leaving very few water molecules available to support the growth of micro-organisms⁷. Honey is reported to be effective against: MRSA, 58 strains of *Staphylococcus Aureus* and 20 strains of *Pseudomonas*^{13,12,9}. Five studies report infected wounds dressed with honey becoming sterile within 3-10 days^{10,8,17}. The osmotic effect is reduced as honey becomes diluted with wound exudate.

The acidity range of honey is also important. The pH of undiluted honey (3.2-4.5) is low enough to inhibit the growth of many animal pathogens, as the optimal pH for these species is from 7.2-7.4. However, as body fluids dilute honey, this will increase pH.

The formation of hydrogen peroxide by honey is thought to contribute the major antibacterial effect⁴. The hydrogen peroxide is produced through the action of an enzyme (glucose oxidase) that bees add to nectar to assist in honey formation^{7,21}. This enzyme is almost inactive in full strength honey due to honey's low pH, however becomes active on dilution with body fluids⁶. This provides a slow release of hydrogen peroxide at a level which is antibacterial but not tissue damaging that continues for at least 24 hours^{6,7,8}. Honey also has high levels of antioxidants which it is thought protect wound tissues from oxygen radicals that hydrogen peroxide may produce^{7,11}. It is believed that variation in the antibacterial potency of honey is mainly due to different amounts of hydrogen peroxide formed⁷. Some nectar contains components that break down hydrogen peroxide or destabilise

the enzyme⁷. Exposure of honey to heat and light also inactivates the enzyme that produces hydrogen peroxide^{4,7}.

It is thought some nectar contributes plant-derived chemicals which provide antibacterial components⁶ in addition to hydrogen peroxide. Several different chemicals have been identified by various researchers.

Variation in Antibacterial Action

Variation in antibacterial activity is due to floral source, method of processing and storage conditions^{13,2}. In a study of 345 New Zealand honeys, 36% showed virtually no detectible antibacterial activity with the remainder showing antibacterial activity varying over a twenty-fold range⁶.

Promotion of Tissue Growth⁷

A number of animal studies have concluded that honey promotes formation of clean granulation tissue.

Theories as to the mechanism for this are:

- the low levels of hydrogen peroxide stimulate angiogenesis and fibroblasts,
- the acidic nature causes more oxygen to be released from haemoglobin, and
- honey contains wide range nutrients including amino acids, vitamins and trace elements³.

Anti-inflammatory Action⁷

The anti-inflammatory action of honey has been noted on experimental wounds on animals and supported by clinical observations which include:

- » reduced inflammation
- » reduced oedema
- » less exudate, and
- » has a soothing effect

Deodorising Action

Honey is also thought to have a deodorising action on wounds.

This is probably due to the high glucose content which is used by infecting bacteria in preference to amino acids, resulting in production of lactic acid rather than ammonia, sulphur compounds and amines^{7,17}.

Debriding Action

Although honey is claimed to have a debriding action the mechanism for this has not yet been explained^{7,17}.

The Evidence

There are numerous published in vitro studies and 10 studies carried out on animals¹⁹.

There are 38 published reports of honey used as a clinical dressing for the following wound types¹⁹:

- Infected and malignant wounds
- Abdominal wound disruption
- Fresh, partial thickness burns (including burns)
- Chronic wounds and ulcers



Limitations of the Research¹⁸

It is worth noting there are limitations with the research base. There are only a relatively small number of published studies, with some being of poor design and/or reporting.

Problems with the published literature include:

- » Inadequate description of wound depths
- » conclusions are drawn without supporting data.

- » honey type not stated,
 - » poor controls (eg saline, antiseptics, potato peel)
- There are few good randomised controlled trials (RCTs)¹⁵ with human subjects and many studies are performed in developing countries where honey is available and inexpensive and therefore an attractive treatment option.

Adverse Reactions

Although honey is a relatively safe product it is not entirely without risk. Honey can contain clostridial spores, posing a small risk of wound botulism¹⁷. To overcome this, honey may be sterilised with gamma irradiation to kill clostridial spores without loss of antibacterial activity⁷. Honey can also cause wound dehydration¹⁸ and there are reports of pain or burning on application¹⁷. There are reports of honey allergy¹⁸. Honey can be toxic if obtained from a toxic floral source¹⁸.

Which Honey?

There are only two honeys available for sale with tested antibacterial activity²⁰. Manuka Honey (*Leptospermum scoparium*) from New Zealand and *Leptospermum polygalifolium* from Australia. These honeys are available for topical and oral ingestion through some pharmacies or by mail order.

The Problems of Honey

Whilst there are a number of published papers on the advantages of using honey as a wound treatment, its use continues to remain infrequent. This may be due to a number of factors including: the potency of antibacterial activity varying significantly from sample to sample¹⁰ and the loss of antibacterial activity as honey becomes diluted with body fluids. There is also a lack of consensus on how much or how often to apply honey and the best method of application.

TGA Approval

The Therapeutic Goods Administration states the following in relation to honey: 'Honey is suitable for use as an active ingredient in listable therapeutic goods in Australia. It is likely to find use in products such as ointments for the treatment of minor burns, cuts and skin infections. While it may be suitable for use in oral rehydration products and to treat severe burns and wounds such treatment would require medical supervision and products for these uses would require Registration'¹⁸.

Implications for Practice

Whilst there is a body of literature supporting the use of honey as a wound treatment, honey, like all treatments should be applied in order to achieve stated objectives within a defined time period and investigation of wound aetiology and history must be considered in treatment choices. If honey is to be used as a wound treatment it is recommended that it be used in conjunction with the client's treating medical officer and a honey specifically designed for use on wounds is advocated.

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COMING EVENTS

"2002 A wound odyssey", 4th Australian Wound Management Association Conference, 7-10 March 2002, *Adelaide Convention Centre*. For more information or a registration brochure contact: PO Box 1280, Milton Qld 4064

Education meeting of SAWMA and Infection Control Association of SA, 21 November 2001, University of South Australia, Rm C6-18, Members free, non members \$5.00

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