

Clinical evaluation of honey-based products for lower extremity wounds in a home care setting

Filip Kegels

Abstract

Aims: To evaluate the efficacy of commercially available honey-based products for the treatment of lower extremity wounds in a home care nursing setting. **Methods:** Twenty-two patients with lower extremity wounds (six male and 16 female, with an average age of 64 years), were retrospectively selected. Six patients had venous insufficiency, five had diabetes and the remaining patients had hypertension or rheumatoid arthritis as a major underlying aetiology. All the patients had non-healing wounds of at least four weeks' duration, in which they had been treated primarily with povidone iodine or fusidic acid. Fifty percent of the wounds were infected. All the wounds were treated with honey-based products, and only covered with a secondary dressing for protection or absorption of exudate. **Results:** Infected wounds were controlled within a few days. All the wounds progressed to healing without any adverse effects. Blood glucose levels remained unaffected and dressing changes were pain-free, with dressings being easy to apply. **Conclusions:** The results indicate that honey-based products are antibacterial, help to debride the wound and promote wound healing, and are safe and easy to use as well as being cost-effective. **Conflict of interest:** None.

KEY WORDS

Retrospective study
Home care nursing
Lower extremity wounds
Honey-based products

In 2002 the first CE-marked honey-based products for wound care were introduced to the European market.

Publications and research have established a body of evidence to support the use of honey as a wound dressing (Molan, 2006). Molan (2006) cites the following to support the use of honey for the management of wounds

- ▶▶ The antibacterial activity rapidly clears infection or prevents infection, providing a moist healing environment without the risk of bacterial growth occurring.

- ▶▶ It debrides wounds fast and removes malodour
- ▶▶ Its anti-inflammatory activity reduces oedema and exudate and prevents or minimises hypertrophic scarring
- ▶▶ It stimulates the growth of granulation and epithelial tissue so that healing is hastened
- ▶▶ It creates a non-adherent interface between the wound and the dressing, enabling dressings to be easily removed without pain or damage to new tissue.

A marked increase in the activities of glycolytic enzymes measured in experimental wounds when compared to control wounds, indicates that honey, which contains 40% glucose and 40% fructose, provides sufficient energy for the cellular activity needed for healing (Sumitra et al, 2009). Thus, honey has been found to be a suitable treatment option for wounds, burns and various skin conditions, such as tinea, radiotherapy-induced skin reactions, seborrheic dermatitis, dandruff, psoriasis and fungal conditions (Bardy et al, 2008).

As honey can contain non-pathogenic *Bacillus spp* and clostridial spores, it should be free from residues and sterilised for wound care. Gamma

irradiation of honey has been proven to overcome this, without damaging the efficacy of the honey (Postmes et al, 1993). Supermarket honeys can have potentially pathogenic organisms present which could infect vulnerable patients. Thus, the use of non-sterilised honey samples cannot be justified (Cooper and Jenkins, 2009). From a practical point of view, pure (sterilised) honey can be a messy product to apply and can easily run off the body, as body heat makes the product more fluid. Manufacturers of honey-based dressings have found ways to overcome this practical issue, without compromising the efficacy of the products (White, 2005).

Study objective

The objective of this retrospective evaluation was to study the efficacy of commercially available honey-based products for the treatment of lower extremity wounds in a home care nursing setting.

Methods and materials

Over a five-year period (2003–2008), data of patients with lower extremity wounds were documented by the author and nursing home care staff. Patients were selected retrospectively following a standardised protocol.

Inclusion criteria included:

- ▶▶ Patients with wounds to the lower extremities that needed medical attention, or that had failed to progress through an orderly and timely sequence of healing (Gottrup et al, 2010)
- ▶▶ Patients with wounds with sloughy or necrotic tissue that required debridement, management of critical colonisation, or bioburden reduction.

The criterion for exclusion was:

- ▶▶ Patients with a life expectancy of less than six months.

The primary outcome was time to full healing. Secondary outcomes included:

- ▶▶ Debridement
- ▶▶ Adverse effects
- ▶▶ Pain.

In addition, ease of use and cost-effectiveness of the products were evaluated.

The evaluation was conducted in a home healthcare setting. At the start, the lead investigator had 12 years of experience as a nurse practitioner in the home healthcare setting. The practice consists of six fully licensed home care nurses and covers a community of approximately ten thousand inhabitants close to Antwerp (BE), St Gillis-Waas. The community consists mainly of an elderly population. About 10% of the home care nurse's time in this practice is spent on wound care. Wound care management is done in collaboration with the general practitioner or the attending specialist at the hospital.

Two honey-based products were used: L-Mesitran™ Ointment and L-Mesitran™ Soft (Triticum, NL). L-Mesitran Ointment consists of 48% medical grade honey, ultra-purified hypoallergenic medical grade lanolin (Medilan™), zinc oxide, Aloe Vera, sunflower oil, calendula officinalis, vitamins C and E and cod liver oil (retinol, vitamin A).

L-Mesitran Soft gel has 40% medical grade honey, ultra-purified hypoallergenic medical grade lanolin

(Medilan), polyethylene glycol and vitamins C and E. These ingredients offer additional benefits to wound management and healing (Cutting and Davies, 2005), such as anti-inflammatory, immunostimulatory and antioxidant properties, the synthesis of collagen, and the promotion of angiogenesis.

At the start of the evaluation (2003), no other honey-based products were available in Belgium.

After cleansing the wound bed with saline, the honey-based products were applied with a sterile spatula in a thin layer. The wounds were covered with a low-adherent dressing (Melolin, Smith & Nephew). Treatments were carried out daily in the patients' homes by the author and the nursing staff, or every other day, depending on the amount of exudate and/or infection present.

Patient information

All patients gave verbal consent to treatment and the use of the data collected. Twenty-two patients were

enrolled in the evaluation, six male and 16 females (Table 1). Sixteen patients were older than 60 years. Seven patients (aged 15–90) were in good health, or had no underlying aetiologies that might influence wound healing. Six patients had venous insufficiency (aged 68–84); five patients had diabetes (aged 49–81); and the remaining patients (4) had hypertension or rheumatoid arthritis as a major underlying aetiology (Table 2). The wound locations were all on the lower extremities; 16 on the lower right leg; five on the lower left leg and one patient (C-076) had wounds on both heels (Table 3).

All the patients included in the evaluation had non-healing wounds that had been present for an average of almost four weeks, i.e. they were not progressing to healing or worsening. No control group was needed, as the status of the patients' wounds before starting the honey-based treatment fulfilled this role (Moghazy et al, 2010).

Table 1
Patient population

	Patients	Average age (years)	Mean healing time (days)
Male	6	62	87
Female	16	68	61
Total	22	64	65

Table 2
Underlying aetiologies

	Male	Female	Total
Healthy	2	5	7
Venous insufficiency	1	5	6
Diabetes	2	3	5
Hypertension	1	1	2
Rheumatoid arthritis		2	2
		Total	22

Table 3

Overview of cases

Case	Sex	Age	Wound type	Location of wound	Underlying pathology	Time wound present before Mesitran use	Wound appearance	Previous product used	Product used	Time to full healing (days)	Year of case
C-014	M	23	Trauma	R lower leg	N/A	4 weeks	Necrotic	Povidone iodine	LM	46	2003
C-015	F	61	Trauma, varices	R lower	N/A	10 days	Slough	Nitrofurazone	LMS	7	2008
C-016	F	90	Skin tear	L lower leg	Lung		Necrotic	None	LMS	28	2008
C-019	M	69	Trauma	R lower leg	N/A	14 days	Necrotic	Povidone iodine	LMS	35	2006
C-020	F	15	Trauma	R lower leg	N/A	3 weeks	Necrotic	Povidone iodine	LM	18	2008
C-024	F	78	Trauma	R lower leg	Venous insufficiency	3 weeks	Slough	Fucidic acid	LM	64	2003
C-025	F	86	Trauma	R foot and r hand	Rheumatoid arthritis		Slough	None	LM	34	2008
C-026	M	49	Diabetic foot	R foot	Diabetes mellitus type I	0 (after hospital discharge)	Necrotic and sloughy	Povidone iodine (in hospital)	LM	148	2006
C-028	M	72	Pressure ulcer	L foot	Venous insufficiency	7 days	Necrotic	None	LM	104	2006
C-031	F	47	Diabetic foot	L ankle	Diabetes	3 months	Infection	Fucidine	LM	63	2008
C-033	F	35	Pressure ulcer	R foot	N/A	9 days	Necrotic	Duoderm gel	LMS	120	2002
C-034	F	72	Traumatic	R ankle	Diabetes	29 days	Slough and fibrin	Povidone iodine, hydrocolloids	LMS	56	2003
C-036	F	83	Pressure ulcer/venous arterial insufficiency	R lower leg	Venous insufficiency	1 month	Necrotic	Regular superabsorbent dressing	LMS	23	2004
C-066	F	76	Small trauma	L ankle	Mild hypertension	3 weeks	Necrotic	Povidone iodine tulle	LMS	36	2003
C-067	F	72	Venous ulcer	R lower leg	Venous insufficiency, diabetes type 2	1 month	Infection, slough	Povidone iodine, hydrocolloid dressing	LMS	28	2003
C-068	F	60	Skin tear	R lower leg	Rheumatoid arthritis	10 days	Necrotic and slough	povidone iodine/saline spray, mechanical debridement	LMS and foam	73	2004
C-069	M	77	Small trauma	R lower leg	Hypertension	4 weeks	Slough		LMS	6	2004
C-070	M	81	Small trauma (venous ulcer)	R lower leg	Venous insufficiency, diabetes type 2	4 weeks	Infection and slough	Povidone iodine	LM and net	180	2005
C-074	F	68	Venous ulcer	L ankle	Venous insufficiency	9 months	Infection	Zinc oxide paste and iodochlorhydroxyquin	LMS and net	300	2004
C-076	F	84	Pressure ulcer	Both heels	Venous insufficiency	2-3 months		NPWT	LMS	42	2005
C-077	F	82	Trauma	R ankle	N/A		Necrotic, slough	None	LMS	21	2007
C-078	F	81	Chronic wound	L ankle	Venous insufficiency	0	Necrotic	Fusidic acid and mupirocin ointments	LMS	81	2004

LM =Ointment
LMS= Soft

Results

All 22 patients completed the evaluation and their wounds healed without any adverse effects. The difference in mean healing time between the healthy group of patients and the venous insufficiency or the diabetes group is significant; 39 days (healthy) versus 99 days (venous), and 96 days (diabetes). The mean healing time of all wounds was 65 days. There was a difference between male (87 days) and female (61 days) mean healing time (Table 1). However, no founded comparison conclusions between genders could be drawn, as the male group was less than half the size of the female group. It was also impossible to make a comparison between age groups, the 60 and over category (n=17) being considerably larger than those under 60 (n=5).

Before being treated with the honey-based products, the wounds evaluated had shown little or no progress, and some had even deteriorated (C-020, C-075). On average, the wounds had been present for almost four weeks (27 days mean). The most used product in that period was povidone iodine or fusidic acid, combined with low adherent dressings (e.g. non-woven dressings and gauze).

Eleven of the wounds (11/22=50%) showed clear signs of infection when the honey treatment was started (Table 3), but this was controlled within a few days. Clinical signs of infection included, slough, temperature of the (peri) wound area, pus and delayed wound healing (Cutting and Davies, 2005). No cultures were taken, as this is not always possible within a home care setting. No additional antibiotics were used, indicating that the infection was controlled by the honey-based products alone. Within the treated diabetes group, no elevated blood glucose levels were reported.

There was no adherence of the dressings to the wound bed at dressing changes. The fatty components in the honey-based products seemed to prevent this, resulting in pain-free dressing changes. The nurses reported that the honey-based products were easy to apply. Some patients (C-068, C-069, C-070, C078, n=4) reported

minor sensation from the ointment, which went when switched to the soft gel. Both products quickly debrided the wounds, although the ointment was more effective than the soft gel during the granulation stage of wound healing.

It was found that, on average, a 5x5cm wound with low to moderate exudate could be treated over a four-week period with 15–20g of the honey-based product, at an average cost of seven euros (6.20GBP/9.95USD, April 2011).

Discussion

The clients of the home care nursing practice tend to be elderly, in whom wounds in the lower legs are common (Harrison et al, 2005). In the home care setting, wound treatment consists of cleansing the wound with water or saline, reducing the bacterial load with antiseptics (and/or antibiotics), and finally covering the wound with dressings to promote moist wound healing and protect delicate tissue from further damage and/or (new) bacterial contamination. In the author's opinion, these three steps create a positive environment for wounds healing by secondary intention. The challenge for the nurse is to select the appropriate product after accurately assessing the wound.

One of the most commonly used products to reduce bacterial bioburden is povidone iodine. The use of povidone iodine in wound care has been debated (Leaper and Durani, 2008), and, although it is a good antiseptic, it does not effectively promote wound healing (Burks, 1998). In fact, studies on the effect of povidone iodine have shown impaired wound healing, reduced wound tensile strength, and even infection (Kramer, 1999; Thomas et al, 2009).

In this evaluation, one patient presented with a dry wound with a thick layer of povidone iodine in the wound bed, which was preventing healing. The application of the honey-based products debrided the wound and made healing possible. This was observed in all cases, indicating that honey-based products are a helpful tool in the home care setting for wound debridement.

This correlates with the findings in the United Kingdom where a large series of carefully controlled case studies (in excess of 50) in a primary care setting resulted in debridement and odour management with the same honey-based products as used in this evaluation (Stephen-Haynes, 2005). The products were also found to be cost-effective. Smaropoulos et al (2011) recently reported that the honey-based products outperformed povidone iodine in healing time (19 vs 25–31 days) when treating paediatric burns and dermal trauma. In the author's opinion, the role of povidone iodine as a first-line of defence against bacteria could be seen as a treatment of the past with this 'discovery' of honey-based products.

Research has shown that honey-based products provide a useful alternative to antimicrobial agents for the management of wound infection, due to their ability to kill a broad spectrum of bacteria, including antibiotic-resistant strains (French et al, 2005; Molan, 2006; Maeda et al, 2008). Smaropoulos et al (2011) cite that *in vitro* research into L-Mesitran Ointment and L-Mesitran Soft using antibiotic-resistant clinical isolates and extended-spectrum beta-lactamase (ESBL) strains of bacteria showed both products to be effective. These findings are corroborated by this evaluation, where infected wounds were found to improve rapidly after the application of the honey-based products, and progressed to healing.

Randomised controlled trials (RCTs) have compared the use of honey with silver sulfadiazine, povidone iodine, saline and mupirocin in wounds varying from partial thickness to chronic leg ulcers (Molan, 2006; Robson et al, 2009). They show that honey reduces bacterial burden and improves wound healing without adverse effects, whereas silver-based dressings can have a negative influence. A recent *in vitro* study (Du Toit and Page, 2009) demonstrated that silver interfered with epidermal cell proliferation and migration, implying that it contains cytotoxic material. In a direct comparison with honey-based products, the honey based products stimulated epidermal cell proliferation (Du Toit and Page, 2009).

In this evaluation, 22 patients with lower extremity wounds benefited from the honey-based therapy. Before its introduction, these patients had previously been treated with a variety of products over a mean time period of 27 days, during which no improvement was observed in the condition of the wounds. With the introduction of the honey treatment regimen, the wounds progressed to healing. This finding emphasises the importance of selecting the appropriate treatment from the onset to ensure optimal wound healing, patient comfort and cost-effectiveness.

The patients with diabetes in this evaluation (5/22=22%) did not find that the use of honey-based products affected their blood glucose levels. In a randomised blinded study (Blokhuys, 2005), patients with diabetes with chronic neuropathic foot ulcers (ankle arm index >0.5) were randomised for treatment with honey ointment (n=16) or conventional treatment (n=16). The honey treatment proved to be effective and did not cause changes in the blood glucose levels.

Conclusion

The honey-based products were evaluated over a five-year period in twenty-two cases of lower extremity wounds. Although this is a relatively small number of highly selected patients, the results indicate that these honey-based products:

- ▶▶ Are antibacterial
- ▶▶ Reduce infection
- ▶▶ Debride and deslough
- ▶▶ Promote granulation and epithelialisation
- ▶▶ Have no adverse effects
- ▶▶ Do not influence blood glucose levels
- ▶▶ Are safe and easy to use
- ▶▶ Are cost-effective.

Within the home care nursing practice in St Gillis Waas, the honey-based products have become the standard of care for wound management and continue to provide results in the treatment of chronic, acute and/or infected lower extremity wounds. **WUK**

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Key points

- ▶▶ Key features of honey-based products are debridement, and the promotion of granulation and epithelialisation.
- ▶▶ The honey-based products were found to be safe, easy to use and cost-effective in the home care setting.
- ▶▶ Non-healing lower extremity ulcerations can be effectively treated with the honey treatment regimen.