CASE REPORT

Case report on the Use of a Honey on Diabetic Foot Ulcer Patients

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Abstract

This article describes four infected diabetic foot ulcer patients who were treated with honey dressing as fragmented therapy. Quantitative and qualitative descriptions of the ulcer-healing process were documented. All four ulcers showed positive wound contraction and reduction in size, and clinical signs of infection were absent at the end of the follow-up period. Moreover, surrounding skin maceration and trauma were absent in all wounds. Adequate moisture control was also achieved, evidenced by a healthy red granulating base and a thin layer of clear light exudate in all four cases. These reports provide little evidence that the use of honey dressing is effective in combating wound infection. Honey dressing can be used to improve wound healing in chronic diabetic foot ulcers.

Keywords: Diabetic foot ulcer; honey

Introduction

The number of people suffering from diabetes mellitus (DM) in Asia more than doubled from 62 to 132 million between 2000 and 2010 (Tong, 2009). According to a study on the prevalence of diabetes, Indonesia ranks fifth highest, with 7.6 million patients, despite a relatively low prevalence of the disease in 2012 (Soewondo, Ferrario, & Tahapary, 2013). Forty-eight percent of the patients aged 20–79 years have type 1 and type 2 diabetes. Two regions with the highest prevalence of diabetes in Indonesia are Ternate, a small remote island in Eastern Indonesia, in which a prevalence of 19.6% was reported in the suburban population, and the province of West Kalimantan (Soewondo, Ferrario, & Tahapary, 2013).

People with DM are susceptible to the development of foot and plantar ulcerations. Such incidences have been attributed to a triad of factors, namely, the presence of sensory neuropathy, ischemia, and an elevated plantar loading pressure (Tong, 2009). Foot ulcers and amputations are major causes of morbidity, disability and emotional and physical costs for people with DM. Many nontraumatic lower-limb amputations, and other costly medical treatments for chronic wounds have been attributed to the incidence of diabetic foot ulcers. When the ulcers are infected, cellulitis and osteomyelitis can quickly develop (Shojaiefard, Khorgami, & Larijani, 2008). Therefore, it is of paramount importance that any apparent local wound infection should be treated early and aggressively. The use of honey dressing for local wound infection may be effective because honey has been shown to have wound healing effects (Shojaiefard, Khorgami, & Larijani, 2008). Honey is produced from many different floral sources, and its antibacterial activity varies depending on origin and processing. Different

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sources of these plants will also affect the quality of the composition of the honey and its effect on tissue repair (Manyi-Loh, Clarke, & Ndip, 2011).

In general, honey is composed of mineral; Potassium, Sulfur, Chlorine, Calcium, Phosphorus, Magnesium, Sodium, Iron, Copper, Manganese, and vitamin; Riboflavin, Pantothenic, Niacin, Thiamin, Pyridoxin, and Ascorbic acid (Ball, 2007). Another study showed that honey is a mixture of sugars (about 40% fructose, 30% glucose and 10% maltose) and includes oligosaccharides, minerals, carbohydrates, enzymes and phytochemicals, such as flavonoids and ferulic and caffeic acids (Wahdan, 1998). Honey, the most ancient wound treatments, is taking its place in modern wound care. Like modern wound dressings, it is easy to apply, painless and comfortable, harmless to tissues, antibacterial, creates a moist healing environment and stimulates healing and epithelialization (Molan & Betts, 2004).

This case report describes four infected diabetic foot ulcer patients who were subsequently treated with honey dressing using gauze. Honey has shown its effectiveness against two serious bacteria-producing problems, namely methicillin-resistant *Staphylococcus aureus* (MRSA) and *Pseudomonas aeruginosa*. Honey has an antibacterial activity that could be seen to be effective in preventing the growth of bacteria on the surface of a wound even after a tenfold dilution of the honey with the secretions from the wound (Haryanto et al., 2012; Surahio et al., 2012). Furthermore, prolonged use of honey in wound dressing does not lead to drug resistance as seen in the use of antibiotics.

This case report aimed at to non-comparatively evaluating the efficacy of honey traditional dressing in treating infected diabetic foot ulcers. The cases were taken from the home care setting, patients who went out from the hospital. Prior to its use in patients, honey was sent to the microbiology laboratory of the Ministry of Health in Pontianak-Indonesia. It was found to be sterile and free of *Clostridium difficile* spores. The patients gave informed written consent to participate in the case report, which was approved by the Ethical Committee of the Nursing Institute of Muhammadiyah Number 03/II.I.AU/EC/V/2015. The standard of Kitamura Wound Clinic management for all four ulcers included regular sharp debridement of surrounding cellulites and nonviable and slough tissues, if any. The clinical outcomes of the ulcer-healing process are described quantitative and qualitatively.

Case Presentation 1. Punctured by Fish Spines and Infected

Clinical history

A 43-year-old female presented with an ulcer on the heel of her left foot and stayed 7 days in the regional public hospital. The wound dressing was changed every day at home using honey by a diabetic wound care nurse.

Wound care management and clinical outcome

The patient was discharged from the hospital on 12 July 2015. First wound assessment was performed on 19 July 2015 using Photographic Wound Assessment Tool (PWAT), and the score was 15, pain numeric score was 1, and there was no laboratory evidence of systemic infection. The patient had received oral antibiotic treatment consisting of metronidazole 500 mg every 12 hours and metformin 500 mg every 8 hours. Honey-impregnated gauze dressing was applied as the primary dressing and Melolin gauze as the secondary dressing. The dressings were changed every day by a

diabetic wound care nurse. On 23 September 2015, the wound bed appeared with bright red granulation tissue, moderate serous exudate and maceration, with a slightly hyperkeratonic wound edge. On 26 October 2015, PWAT score was 6 and numeric pain scale was 0. The wound condition showed almost complete healing (figure 1).

Figure 1. The wound condition that showed almost complete healing

Case Presentation 2. Infected Diabetic Ulcer from an Insect Bite

Clinical history

A 53-year-old Malay female presented with an ulcer of the dorsalis pedis on the left foot. The ulcer was caused by an insect bite on 16 July 2015 and got infected. She initially stayed at home and then went to the community health center services. The patient was administered an oral antibiotic of clindamycin (300 mg, every 12 h, daily for 12 days) and an oral antidiabetic drug. The wound was treated using honey and was managed in a home-care setting with dressings changed every other day by the community public health nurse for 15 days.

Wound care management

On 1 August 2015, the patient went to the wound clinic to prepare for home care setting. At the first wound assessment, PAWT score was 17. The numeric pain scale was 2. There was no laboratory evidence of wound infection. The wound bed showed spongy full necrotic tissue that was moist and a defined wound edge; the surrounding skin condition did not appear inflamed or erythematous. The wound was debrided in the clinic, and at the time of debridement, the wound bed had been filled with granulation tissue. Honey-impregnated gauze dressing was applied as the primary dressing, and Melolin gauze as the secondary dressing; dressings were changed every day. It should be noted that the patient was still taking oral antibiotics between 1 August and 14 August 2015. She was subsequently discharged on 27 September 2015, and the wound was managed at home by a diabetic wound care nurse at the request of the patient.

Clinical outcome

At discharge, the surrounding skin of the wound did not show any signs of trauma, such as maceration or skin breakdown. The wound appeared to have healthy granulation tissue and epithelialization and a clear exudate. An oral antidiabetic was also being used. PAWT score was 4 at discharge, and numeric pain score was 0. No signs of acute infection were noted during the dressing changes. It was clear that the dressing provided adequate moisture balance without macerating the wound margins. It also provided a conducive environment for laying new granulation tissue. The wound bed showed a healthy red granulating base (figure 2).

Figure 2 A healthy red granulating base of the wound bed

Case Presentation 3. Infected Diabetic Ulcer with Trauma

Clinical history

A 63-year-old Arabian female presented with an ulcer of the dorsalis pedis on the right foot and a history of type 2 diabetes. The ulcer appeared on 16 January 2015 and got infected at home. She went to the community health center and was referred to the public hospital. The patient was administered antibiotic systemic; metronidazole (100 mg, daily) and ceftriaxone (1 g, every 12 h) for 12 days and given an insulin injection. The patient had her first and fourth fingers amputated from the hospital. The patient was discharged from the hospital on 7 February 2015 at the request of the patient. The wound dressing was changed every day by a home-care nurse from the hospital.

Wound care management

On 18 March 2015, the patient was referred to the Wound Care Clinic for management of the wound. Upon admission to the wound clinic, the wound was assessed with PAWT and the score was 14. The numeric pain scale was 3. Then the patient was managed at home by diabetic wound care nurses. The wound bed showed slight growth of granulation tissue, exposed tendon and moderate serous exudate; the surrounding skin condition did not appear inflamed or macerated (Figure 3). The fifth finger was soft necrotic, almost lysis, and was amputated. A lysis tendon was debrided gradually by a wound care specialist. No laboratory evidence of wound infection was noted. Honey-impregnated gauze dressing was applied as the primary dressing, and Melolin gauze was applied as the secondary dressing; these were changed every day. The patient was still taking oral antibiotics between 18 March and 2 May 2015. Both amputated fingers showed growth of healthy granulation tissue.

Clinical outcome

On 28 May 2015, the surrounding skin of the wound did not show any signs of trauma, such as maceration or skin breakdown. The wound bed showed healthy granulation tissue, minimal serous exudate and good epithelialization. The patient was subsequently discharged on 23 August 2014. At discharge, the wound appeared healed and epithelialized (figure 3); the scores of PAWT and Numeric pain scale were 0.

Figure 3 The wound appeared healed and epithelialized

Case Presentation 4. Infected Diabetic Ulcer with Furuncle

Clinical history

A 67-year-old Chinese female presented with an ulcer at the knee that extended to half of the anterior tibia on the right leg. The ulcer first appeared on 1 June 2015 and got infected at home. On 9 June 2015, she was referred to the private public hospital as an inpatient and remained there until 29 June 2015. She received treatment in the hospital, but this management was not well documented. She had a history of type 2 diabetes. A wound swab at the wound bed was not taken. The patient was discharged from the hospital at the request of the patient.

Wound care management

The patient went out from the hospital and was managed by diabetic wound care nurses at home on 30 June 2015. Wound assessment with PAWT was 16, and numeric pain scale was 3. No laboratory evidence of wound infection was noted. The wound bed showed a slough with yellow and brown and granulation tissue, heavy serous exudate, odor and an undefined wound edge; the surrounding skin condition did not appear inflamed or erythematous. Honey-impregnated gauze dressing was applied as the primary dressing, and Melolin gauze as the secondary dressing; these were changed every day and were identified by a combination of colors of green and yellow. The patient was still taking oral antibiotics (Cefixime 100 mg, every 12 h) given daily for 14 days and insulin injections. She was subsequently discharged on 20 November 2015, and the wound was managed at home by their family.

Clinical outcome

The surrounding skin of the wound did not show any signs of trauma, such as maceration or skin breakdown, throughout the changes of the dressing with honey. An exudate was absorbed into the dressing in the exact size of the wound. The use of honey dressing was important in controlling the infection of the wound, especially where the wound bed was deeply tunneled. The wound had almost healed by 20 November (Figure 4). The wound was assessed using PAWT and its score was 2, at discharge and had almost healed, and numeric pain score was 0. The wound condition showed small size and almost healing (figure 4).

Figure 4 Wound condition showed small size and almost healing

Discussion

Many studies have reported the effectiveness of honey in the management of wounds (Bang, Buntting, & Molan, 2003; Haryanto et al., 2012; Mohammadi et al., 2013; Surahio et al., 2014). Our case report showed that the use of honey dressing could control the infection of the wounds. This case report clearly demonstrated that the use of honey dressing in the wound in four patients showed there were no allergic reaction, no significant side effects and no maceration; there was rapid elimination of wound odor, improvement of granulation and epithelialization and reduced exudates. Meanwhile, the phase of wound healing on four patients using honey dressing showed the variation length of healing due to wound size, infection condition, and age. Some literatures reported honey can induce pain, possibly due to its acidity or high osmotic potential (Dunford & Hanano, 2004). This case reports noted that pain was one of the primary outcome measures, and some patient had experienced a mild pain. However, the patients experienced a decrease in pain and even the pain disappeared at the end of treatment and/or they were almost healed.

Based on four patients, only one patient with complete healing, while three patients were discharged because they requested for self-care by their family who had health education and also by community nurse. This case report presented that wound healing process had gone well, and this happened was likely due to the role of diabetic wound care nurses who took care of the patients. This study postulated that nurses may obtain certification as a diabetic wound care nurse who want to take care of the diabetic foot ulcer patients and to document their wound expertise. Further studies are required to evaluate the comparison between diabetes patients with and without neuropathy. In this current case report, the wound size significantly affected the healing process. Honey has been used quite effectively as a wound dressing to promote faster healing and reduce wound size. This case report showed differences in duration of wound healing, which can be affected by age, infection condition and the size of the wound in each patient (Mostafa, 2010; Vowden, 2011). Indeed, it was revealed that honey dressing was more likely to completely treat diabetic wounds. The present case reports highlighted the fact that comparable benefits of honey dressing can be yielded in single application. The limitation of this case report was that the assessment did not use a Doppler vascular and did not evaluate neuropathy.

This case report documented that honey is an effective choice for diabetic wound patients because it provides rapid wound healing. Honey is an alternative medicine deemed to be a suitable topical therapy with improved outcomes and can be implemented in the clinical setting for diabetic wounds. Honey is a cost-effective and safe natural agent with rapid diabetic wound-healing capacity. However, further studies are required to validate laboratory findings, control group, and to establish honey as one of the most effective alternatives of topical medicines for treating diabetic wounds.

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