

Topical Honey Application In Treating Large Ulcerated Wound As a Complication of Vascular Malformation In a 5-Month-Old Baby

Intania Djoenaedi, Gentur Sudjtmiko
Jakarta, Indonesia

Background: The ancient Egyptians and Greeks have used honey for wound care, and a broad spectrum of wounds are treated all over the world with natural unprocessed honeys from different sources. In lots of studies, honey as a conventional wound treatment may help improve wound healing, prevent invasive infections and eliminate colonization. With the increasing frequency of antibiotic-resistant bacteria, modern medicine give attention to natural products. The aim of this report is to gain insight into the practical use of topical honey in wound management.

Methods: We report a case of five-month-old girl with sepsis and large ulcerated necrotizing wound at the external genitalia and perineum extending to gluteal area as complication of vein malformation after treated with intravenous injection of Bleomycin and Vincristine.

Result: She was successfully treated with unprocessed local honey.

Conclusion: Honey is shown to be a good option for treating infected chronic wound with dramatic result.

Keywords: honey, chronic wound, wound healing

Latar Belakang: Orang-orang Mesir dan Yunani di masa lalu telah menggunakan madu untuk perawatan luka, dan di seluruh dunia penggunaan madu alami tanpa pemrosesan telah digunakan untuk berbagai spektrum. Pada banyak studi, madu sebagai terapi luka konvensional dapat mempercepat penyembuhan luka, mencegah infeksi invasif dan menghilangkan kolonisasi. Dengan meningkatnya kasus bakteri yang resisten dengan antibiotik, kedokteran modern mulai memberikan perhatian pada produk alami. Tujuan laporan kasus ini adalah untuk mendapatkan wawasan mengenai penggunaan praktis madu topikal dalam perawatan luka.

Metodologi: Kami melaporkan kasus seorang bayi perempuan 5 bulan dengan sepsis dan luka nekrotik berulkus yang luas pada genitalia eksterna dan perineum meluas ke area gluteal sebagai komplikasi malformasi vena pasca penyuntikan bleomisin dan vinkristin.

Hasil: Pasien menunjukkan hasil yang baik dengan madu lokal tanpa pemrosesan.

Kesimpulan: Madu terbukti merupakan pilihan yang baik untuk menatalaksana luka kronik terinfeksi dengan hasil yang

Kata kunci: madu, luka kronis, penyembuhan luka

Honey has been used to treat a wide range of wound types such as burns, diabetic foot ulcers, infected chronic wound etc.¹ Chronic wounds are a costly source of suffering. An important factor in the failure of a chronic wound to heal is the presence of multiple species of bacteria, living cooperatively in highly organized biofilms. The biofilm protects the bacteria from antibiotic therapy and the patient's immune response.²

Formerly the ancient Egyptians and Greeks used honey for wound care, and a broad spectrum of wounds are treated all over the world with natural unprocessed honey from different sources.^{3,4} Due to the increasing frequency of antibiotic-resistant bacteria which causes significant problem in wound care, modern medicine give attention to natural products and biological therapy methods and their use in clinical practice.⁵ The major arguments for implementation of honey is the low cost in

From Division of Plastic Surgery, Department Of Surgery, Cipto Mangunkusumo General National Hospital, Universitas Indonesia.
Presented in 15 th IAPS Scientific Meetings In Semarang, East Java, Indonesia

Disclosure: The authors have no financial interest to declare or commercial affiliations in relation to the content of this article.

comparison with conventional therapies. Other arguments include the fact that honey has proved to be effective against resistant hospital pathogen and can promote wound healing.⁵

The challenge of managing chronic non healing wounds generated interest in researching non standard therapies. Successful wound treatment with honey has been reported in lots of studies. Success include some dramatic resolutions of large wounds that have not responded to other topical and systemic treatments. Topical honey was shown to be effective in treating postoperative skin wounds in neonates that had failed to respond to antibiotic therapy.⁶ But in Indonesia, honey was not known for its medical properties.

In this report we present our experience in one infant with large, open, chronic ulcerated wound as a complication of external genital vascular malformation that failed to heal with treatment of moist saline dressing and systemic antibiotic.

Honey has been used to treat a wide range of wound types such as burns, diabetic foot ulcers, infected chronic wound etc.¹ Chronic wounds are a costly source of suffering. An important factor in the failure of a chronic wound to heal is the presence of multiple species of bacteria, living cooperatively in highly organized biofilms. The biofilm protects the bacteria from antibiotic therapy and the patient's immune response.²

Formerly the ancient Egyptians and Greeks used honey for wound care, and a broad spectrum of wounds are treated all over the world with natural unprocessed honey from different sources.^{3,4} Due to the increasing frequency of antibiotic-resistant bacteria which causes significant problem in wound care, modern medicine give attention to natural products and biological therapy methods and their use in clinical practice.⁵ The major arguments for implementation of honey is the low cost in comparison with conventional therapies. Other arguments include the fact that honey has proved to be effective against resistant hospital pathogen and can promote wound healing.⁵

The challenge of managing chronic non healing wounds generated interest in researching non standard therapies. Successful

wound treatment with honey has been reported in lots of studies. Success include some dramatic resolutions of large wounds that have not responded to other topical and systemic treatments. Topical honey was shown to be effective in treating postoperative skin wounds in neonates that had failed to respond to antibiotic therapy.⁶ But in Indonesia, honey was not known for its medical properties.

In this report we present our experience in one infant with large, open, chronic ulcerated wound as a complication of external genital vascular malformation that failed to heal with treatment of moist saline dressing and systemic antibiotic.

METHODS

A five-month-old girl was consulted to the Plastic Surgery Division by Pediatric Department with sepsis and chronic ulcerated necrotizing wound at the external genital and perineum extending to gluteal area as complication of vein malformation which had failed to heal with conventional treatment and systemic antibiotic.

She was born with no abnormalities detected. When she was 3-week-old she was noted to have a small red spot at perineal area, the lesion grew appropriate with the growth of her body. The lesion had exhibited ulceration, bleeding and extension. At the age of 2-month-old, the patient has gotten intravenous injection of Vincristine and Bleomycin, each twice injection every week. However there was no improvement from the appearance of the lesion; it has rather become more extensive and exudative. The patient was then admitted to the Pediatric Department due to diarrhea. She was given systemic antibiotic and moist saline dressing for the wound.

On our general examination the child was found to be septic. There was a large open wound involving bilateral labia majora and almost all portion of labia minora; extending to the medial right thigh, perineum and some gluteal area in both sides with a lot of necrotic tissues which got peeled off spontaneously, some granulation tissue, slough, pus and malodor. The meatus urethra externa and spinthet ani externa were intact. Laboratory findings sho-



Figure 1. Before debridement



Figure 2. After debridement



Figure 3. 3-week after treating with honey



Figure 4. 1-month after epithelialization

wed anemia, leukocytosis, thrombocytopenia. Antibiotic-resistant bacteria was found at pus and blood culture examination.

Debridement, cystostomy and colostomy under general anesthesia were done by Plastic, Urology and Pediatric Surgery division immediately. After debridement, the wound was treated with local honey soaked gauze dressing which was changed twice daily. The patient was also given systemic antibiotic by Pediatric Department. The wound showed remarkable improvement following topical application of honey. Honey debrided the wound rapidly, replacing sloughs with granulation tissue. It also promoted rapid epithelialization, and absorption of pus and exudate.

After 3 weeks of treatment, almost 50 % of the wound was already epithelialized spontaneously and contracted; without signs of exu-

date, slough and malodour. After 4 weeks of treatment, all of the wound was already covered by epithel. The general condition of the patient improved significantly with no sign of sepsis, so the patient was discharged from the hospital.

Three months later the the cystostomy was removed by Urology Division. Pediatric Surgery Division could not do the stoma closure as planned because there was stricture of anal sphincter due to wound contraction.

DISCUSSION

Since a long time ago, honey has been used in wounds and skin ulcer treatment until the introduction of antibiotics.^{7,8} Nowadays, its healing properties are again being discovered. Its good application on wounds and infected burns gives satisfactory results.⁷ Reintroduction

of honey as a conventional wound treatment may help improve individual wound care, prevent invasive infections, eliminate colonization, interrupt outbreaks and thereby preserve current antibiotic stocks.²

The management of chronic wound is a major problem especially large ulceration in infected wound.^{8,9} This wound is characterized by tissue loss susceptible to infection due to the normal barrier, dead tissue and production of exudate or pus. The most frequently found bacteria is staphylococcus aureus.⁹ Other bacteria is Pseudomonas. The surgeon should weigh the patient's condition in managing the wound to decrease the morbidities. Wounds will heal rapidly when the patient is in good tissue perfusion, good nourishment condition, no infection and good wound management.

In this case, the author chose conventional treatment to manage the wound because the patient was at a very young age with very large ulcerated wound in contaminated area. The patient was in sepsis, malnourished, immunocompromized condition, and the bacteria found in the wound was resistant to almost all antibiotics. There was also relatively high frequency of nosocomial infection in our institution. Therefore, we prefer to perform surgical debridement only and treat the wound with topical honey until spontaneous epithelialization occurs.

The use of honey is still messy or there is no standardized preparation readily available in most countries of the world. In this case, the author used local unprocessed honey because of the low cost, and high availability.

Honey possesses a broad spectrum antibacterial properties against several bacteria such as Pseudomonas, staphylococci, streptococci and E. coli. Even some antibiotic-resistant bacteria, such as MRSA (Methicillin Resistant Staphylococcus Aureus).¹¹⁻³ However, the rate of inhibition of growth varies with the species of bacteria, the antibacterial activity, processing and the source of honey^{10-1,14}. Honey has high osmolarity, it creates a hygroscopic effect on microbes, thereby interfering with growth and metabolism, increasing tissue perfusion on the wound and decreasing the tissue swelling, reduce edema and exudate.^{9,13,15-6} Nevertheless, an

equivalent osmolarity of various sugars does not match honey's antimicrobial capability.

Honey also has a low pH level of 3 to 5, which in itself inhibits microbe growth.¹⁶⁻⁷ Bee-derived glucose oxidase in honey converts glucose into glucuronic acid, and in doing so generates hydrogen peroxide as a by-product. In its pure state, honey's glucose oxidase activity is less than in honey dilutions of 30% to 50%.^{12,16-8} This reaction occurs after honey has been diluted in the wound. The gradually released hydrogen peroxide has an adverse affect on bacteria but not on the normal cells, thus creating no cellular damage.¹²

Honey helps in the generation of granulation and epithelial tissues because hydrogen peroxide stimulates angiogenesis and the growth of fibroblasts. Also, low pH values and enhanced angiogenesis help release oxygen, stimulating tissue regeneration.^{12,19-20} In animal study, honey dressing enhances wound contraction in which is one of the key features of wound healing.²¹

The odour neutralizing effect is achieved because bacteria in the wound are being inhibited, thus also reducing debris volumes. Also, once the honey has been applied, the bacteria will utilize the sugars it contains. This generates the odorless milk acid.¹² Other benefits using honey in treating the wounds are painless when the dressing is changed because the consistency of honey reduces the likelihood that the dressing will adhere to the wound. As well, the cost of honey compared with other commercial products is minimal, even when repeated applications are required.¹⁷

However, there are no hard and fast rules about the application of honey and much is dependent on the amount of exudate produced by the wound. The maximum levels of accumulated hydrogen peroxide occurred in honey solutions diluted to concentrations between 30% and 50% (v/v) with at least 50% of the maximum levels occurring at 15-67% (v/v). This is equivalent to a 10 cm x 10 cm dressing containing 20 mL of honey becoming diluted with 10 to 113 mL of wound exudate.¹⁸ Dumronglert et al recommends applying the pure honey into the wound about three fourth of the wound then pack it with sterile gauze.^{9,10}

The surface area and position of the wound will naturally affect the choice of dressing suitable for the wound. Honey soaked gauze is often a practical answer to dressing large areas, or circumferential leg ulceration, simply because of its ease of application. It also prevents the honey from leaking into surrounding tissue.¹⁰

Some studies showed that there is no systemic or local side effects using honey.^{7,22} Furthermore, prolonged use of honey does not lead to development of drug resistance as those experienced with antibiotic.¹⁰

SUMMARY

This simple, efficient, cheap and with no side effects treatment deserves being better known and integrated in the set of common wound treatment.⁷ There is justification to use honey when more conventional treatments have failed and we can not perform surgery due to risk of increasing morbidities. Honey is useful in the treatment of large wounds with amazing result. Nevertheless, further study is needed to confirm the efficacy and safety of honey in clinical practice.

Gentur Sudjatmiko, M.D.

*Plastic Surgery Division, Department Of Surgery
Cipto Mangunkusumo Hospital
dr_gentur@yahoo.co.id*

REFERENCES

- Gurtner GC. In: Thorne CH, Beasley RW, Aston SJ, Bartlett SP, Gurtner GC, Spear SL, eds. *Grabb and Smith's plastic surgery*. 6th ed. Philadelphia: Lipincott, Williams and Wilkins; 2007: 16-22.
- Merckoll P, Jonassen TO. Bacteria, biofilm and honey: a study of the effects of honey on 'planktonic' and biofilm-embedded chronic wound bacteria. *Scand J Infect Dis*. 2009; 41(5): 341-7.
- Simon A, Traynor K. Medical Honey for Wound Care—Still the 'Latest Resort'? *Evid Based Complement Alternat Med*. 2009; 6(2): 165-73.
- Broughton G, Janis JE. A brief history of wound care. *Plast Reconstr Surg*. 2006; 117 (6s): 6-11.
- Majtan J. Apitherapy--the role of honey in the chronic wound healing process. *Epidemiol Mikrobiol Imunol*. 2009; 58(3):137-40.
- Boukraa, L. Additive activity of royal jelly and honey against *pseudomonas aeruginosa*. *Altern Med Rev*. 2008;13(4): 330-3.
- Ndayisaba GL, Bazira. Clinical and bacteriological outcome of wounds treated with honey. An analysis of a series of 40 cases. *Rev Chir Orthop Reparatrice Appar Mot*. 1993;79(2):111-3.
- Sharp A. Beneficial effects of honey dressings in wound management. *Nurs Stand*. 2009; 24(7): 66-8, 70, 72 passim.
- Dumronglert E. A Follow up study of chronic wound healing dressing with pure natural honey. *J. Naltl. Res. Council Thailand*. 1983;15(2):40-66.
- Fakoor M, Pipelzadeh MH. A study on the healing effect of honey on infected open fracture wounds. *Pak J Med Sci*. 2007; 23(3):327-29.
- Cooper RA, Molan PC. Antibacterial activity of honey against strains of *Staphylococcus aureus* from infected wounds. *Journal of the royal society of medicine*. 1999;92(1):283-5.
- Overgaauw PAM, Kirpensteijn J. Application of honey in the treatment of skin wounds. *Tijdschrift voor Diergeneeskunde*. 2005;130:115-6.
- Mullai V, Menon T. Bactericidal activity of different types of honey against. 2007;1-(2):95-7.
- Allen KL, Molan PC, Reid GM . A survey of the antibacterial activity of some New Zealand honeys. *J Pharm Pharmacol*. 1991;43:817-22.
- Moore OA, Smith LA. Systematic review of the use of honey as a wound dressing. *BMC Complement Altern Med*. 2001;1: 2.
- Olaitan PB, Adeleke OE. Honey: a reservoir for microorganisms and an inhibitory agent for microbes. *African Health Sciences*. 2007;7(3):159-65.
- Cimolai N. Sweet success? Honey as a topical wound dressing. *Bc medical journal*. 2007;49(2): 64-7.
- Bang LM, Bunting C. The effect of dilution on the rate of hydrogen peroxide production in honey and its implications for wound healing. *J Altern Complement Med*. 2003;9(2):267-73.
- Bergman A, Yanai J. Acceleration of wound healing by topical application of honey: An animal model. *Am J Surg*. 1983 145(3): 374-6.
- Efem SE. Clinical observations on the wound healing properties of honey. *Br J Surg*. 1988;75(7):679-81.
- Osuagwu FC, Oladejo OW. Enhanced wound contraction in fresh wounds dressed with honey in Wistar rats (*Rattus Novergicus*). *West Afr J Med*. 2004;23(2): 114-8.
- Ahmed AK, Hoekstra MJ. Honey-medicated dressing: transformation of an ancient remedy into modern therapy. *Ann Plast Surg*. 2003;50(2):143-7.