Standardization of Honey Application on Acute Partial Thickness Wound

Benni Raymond, Gentur Sudjatmiko
Jakarta, Indonesia

Backgrounds: : In the past few years, clinicians worldwide have been using honey for wound treatment. But until now, there was no such standard on method of honey application on wound. In our center, honey was applied on wound by once a day application and the result was observationally satisfactory. What if application of honey were done once every two days? Would the result become more satisfactory? This study aims to search honey application method, which gives the best result on wound treatment.
Methods: This is a single-blinded non-randomized clinical trial, which was conducted in Cipto Mangunkusumo Hospital Jakarta from July until September 2012. 14 patients with acute partial thickness wound resulted from STSG harvesting were involved in this study. Patients were divided into 2 groups: control (once a day application of honey) and treatment (once every two days application of honey) and the rate of wound healing were evaluated. Rate of wound healing will be assessed as number of percentage of reduced non-epithelialized areas on the seventh day of application.
Results: The mean percentage of non-epithelialized area reduction on treatment group was 86.76%, and 97,97% on control group. There was significant difference on percentage of reduced area between control and treatment group (p< 0,00).
Conclusion: There was statistically significant difference between once a day and once every two days application of honey. However, changing of honey dressing once a day is still a preferable method in wound treatment
Keywords: *standardized honey application, partial thickness wound, AnalyzingDigitalImages®.*
Latar Belakang: Beberapa tahun belakangan, perawatan luka dengan madu telah banyak diterapkan oleh para praktisi klinis di seluruh dunia. Namun sampai sekarang, belum ada prosedur standar tentang bagaimana aplikasi madu pada luka. Di divisi Bedah Plastik RSCM, penggantian balutan luka yang diaplikasikan madu dilakukan satu kali perhari, dan sejauh ini hasilnya memuaskan. Namun bagaimana jika madu diaplikasikan setiap dua hari? Apakah hasilnya akan lebih memuaskan? Kami ingin mencari metode mana yang akan memberikan hasil yang paling memuaskan
Metode: Penelitian ini bersifat prospektif eksperimental dan dilakukan di RSCM pada bulan Juli – September 2012. Penelitian ini melibatkan 14 pasien dengan luka partial thickness akut, dalam hal ini diwakili oleh luka donor STSG. Pasien dibagi dalam 2 kelompok, kelompok kontrol akan diberikan aplikasi madu pada luka tiap hari dan kelompok perlakuan akan diberikan aplikasi madu tiap dua hari. Laju penyembuhan luka akan dinilai sebagai persentase reduksi area yang belum tertutup epitel pada hari ketujuh.
Hasil: Rerata persentase reduksi area yang belum tertutup epitel pada kelompok perlakuan adalah 86,76%, sedangkan pada kelompok kontrol adalah 97,97%. Dari analisa statistik didapatkan perbedaan persentase reduksi yang bermakna antara kelompok perlakuan dan kelompok kontrol (p 0,00).
Kesimpulan: Rerata persentase reduksi area yang belum tertutup epitel pada luka dengan penggantian balutan madu tiap hari dan tiap 2 hari, berdasarkan uji statistik didapatkan berbeda secara bermakna. Penggantian balut madu setiao hari tetap menjadi pilihan terapi untuk perawatan luka.
Kata Kunci: *standardized honey application, partial thickness wound, AnalyzingDigitalImages®.*

Honey is a thick sugar supersaturation solution produced from nectars collected by honeybee (apis mellifera). Ingredients of honey include 30% of glucose, 40% of fructose, 5% of sucrose, and 20% of water. Honey also consists of other substances such as amino acid, vitamin, mineral, and enzyme. Honey has been widely used as wound dressing since the ancient time and once became a basic substance and act as a substance-binder of therapeutic agents. Dioscorides (40-80 C) on de Materia Medicis

From the Division of Plastic Reconstructive, and Aesthetic Surgery University of Indonesia Cipto Mangunkusumo Hospital, Jakarta, Indonesia.

Disclosure: *The authors have no financial interest to disclose.*

had mentioned honey as a carrier of drugs' active substance. Hipocrates (460 – 337 BC) used honey in wound care and introduced honey as a basic ingredient of several medicines. Application of honey on wound care was also stated in Edwin Smith papyrus in Egyptian textbook of surgery written in 2600-2200 BC. London Medical papyrus, written in 1325 BC, also introduced honey as wound dressing for burn. Other traditional medicine as done by Ayuverdic, Chinese, and Roman also used honey on wound care.[1]

The terms of acute and chronic wound were often used in clinical practices, but in the practice of wound treatment, those terms were not always become the main focus. Lazarus once stated that acute wound healing underwent sequential processes on certain period of time. Sequential processes include inflammation, angiogenesis, matrix deposition, wound contraction, epithelialization and scar remodeling. A certain period of time needed for acute wound healing is indeed subjective, but refers to a reasonable and predictable time. Chronic wound, on the contrary, has a disturbed healing phase and prolonged time needed for wound healing.[1,2]

In the last decades, there was a tendency of increasing interest in using honey in wound care with 40 case reports and case series published until December 2006. Until now, there were no such standard on pure honey application on wound. The standard, which exists, is the method of honey product application, such as honey medicated dressing, which follows the instruction of use that stated in the product package.

Based on clinical appearance, the application of honey need change of dressing everyday. This treatment is based on the thought that on more than 1 day application, honey will be liquified causing it's decreasing activities. However, honey liquifying can helps the oxidation process by creating a weak hydrogen peroxide that actually aid the bacterial control. This honey liquifying process become a basis on honey application in treatment group which is once every two days application, because of in three or four days, honey will be liquified and become less effective. In the past experience, changing of dressing once every two days will produce bad odor from the exudate, liquified honey, bacteria, and detached necrotic tissue. Changing of dressing everyday or every two days will not cause pain. It was due to formation of thin layer of film above the newly formed epithel.[3] Based on the description above, authors choose to implement change of dressing of honey everyday and every two days.

This study was conducted to find the best method, that later would become the standardized method, of pure honey application on the open acute wound.[1]

METHODS

This study was a single-blinded non-randomized clinical trial to determine better method of pure honey application on wound between application of honey once a day and once every two days. This study was conducted in plastic surgery ward Cipto Mangunkusumo Hospital, from July – September 2012. Inclusion criteria were 15 – 60 year-old patients who suffered from acute partial thickness wound resulted from STSG harvesting. Exclusion criteria were patients with severe burn, malnutrition, and systemic disease.

We divided patients into 2 groups. Each group consisted of 7 patients with STSG donor wound. Donor wound was photographed with blue background using digital camera. Ruler was included in the photo to measure the size of wound area. The pure honey was applied to donor wound and then closed by transparent film dressing. On treatment group, we changed the dressing every two days, while on control group we changed the dressing everyday. We photographed the wound at each dressing change until day 7. Day 7 was chosen because complete epithelialization in partial thickness wound usually occurs between day 7 – 10. Other reason was that the length of in-patient care after grafts harvesting is usually 1 week.[4]

Photos were given to 3 evaluators in a single-blinded method to evaluate which area of the wound had been epithelialized. The 3 evaluators were senior plastic surgeon, plastic surgery resident, and general surgery resident. The colors of epithelialized area defined by

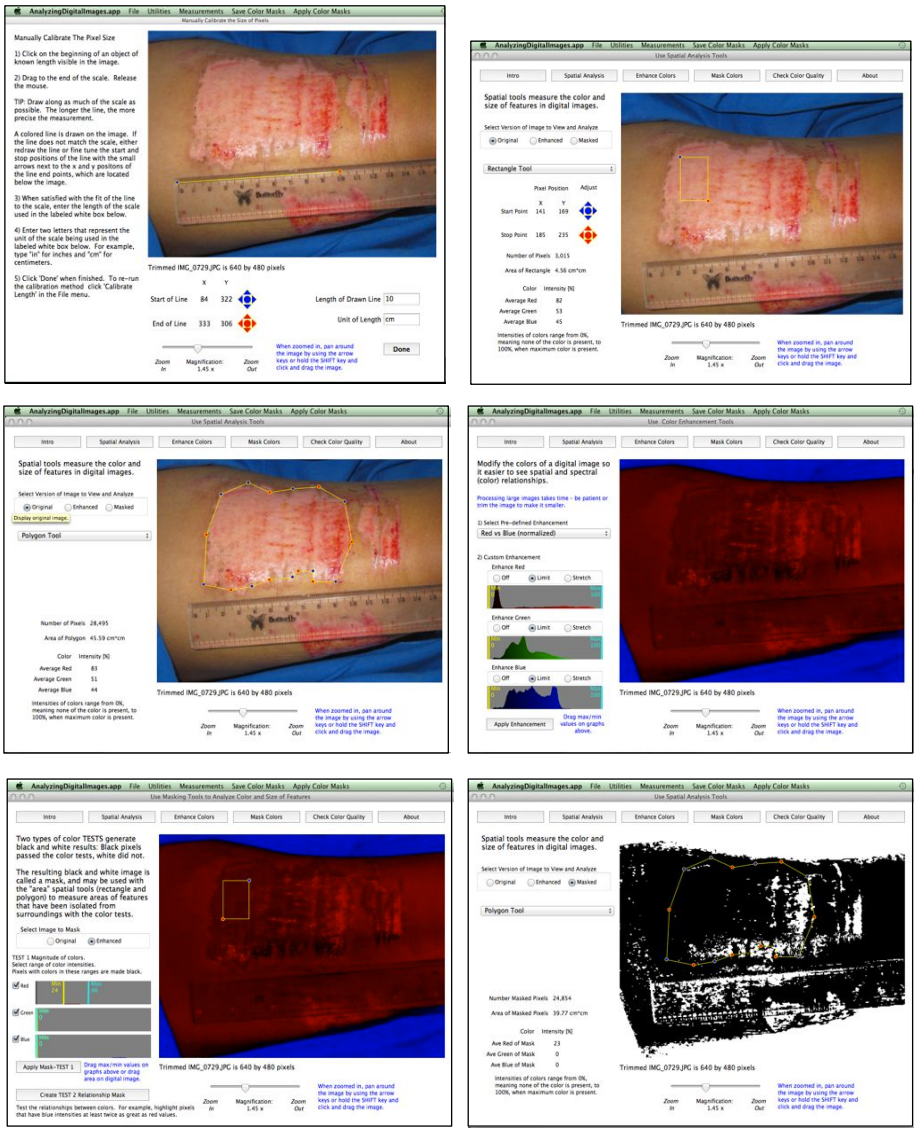

Figure 1. Photo analysis using AnalyzingDigitalImages®. *Spatial tool*, determine the measuring unit (Above Left), Determine the epithelialized area (Above Right) Calculate the wound size (Middle Left), *Color enhancement*, the red color was isolated from the area of wound (Middle Right), *Color masking*, define the epithelialized (Below Left), Back to *spatial tool*, epithelialized area appear as black color and the size of wound can be assessed (Below Right).[4]

Table 1. Percentage of the Non-epithelialized Area Reduction

Control Group	Treatment Group
98,16	87,22
98,99	86,66
97,46	85,90
99,09	95,77
98,10	75,66
95,99	89,23
98,00	86,66

Table 2. Statistic Evaluation

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Object	37.561	6	.000	87.35143	81.6609	93.0419

evaluators were isolated using AnalyzingDigitalImages® program to determine which area have the same color with the isolated color (Figure 1). [4] The epithelialized area then compared with the area of the initial wound to determine the non-epithelialized area and its percentage to initial wound. We compared the mean number from 3 evaluators. These two components were compared between treatment and control group. The data collected then analyzed with SPSS version 17.0. Mann – Whitney test conducted to statistically analyze the compared variables to obtain the significant difference.

RESULT

We evaluated the percentage of non-epithelialized area reduction of each patient on day 7 using AnalyzingDigitalImages® program. The value taken was the mean percentage of 3 evaluators that determined which area had been epithelialized (Table 1).

Difference levels of epithelialization were found in the sample. Assessment was done using AnalyzingDigitalImages® program and the mean percentage were obtained. The mean percentage of non-epithelialized area reduction on treatment group were 87.76% while the mean percentage of non-epithelialized area reduction on control group were 97,97%. From statistic evaluation (Table 2), there were significant differences obtained from the percentage of reduction between control and treatment group (p 0,00).

DISCUSSION

The wounds resulted from STSG harvesting. STSG were harvested using Humby Knife, although it has been calibrated, it will provoke bias due to difference level of skin thickness. Epithelialization was clinically observed through photo evaluation by 3 evaluators who are capable to differentiate area that has been epithelialized. There was a possible bias due to unstandardized lighting during photo shoot.

Despite the mean percentage of non-epithelialized area reduction on control group were faster and statistically significant, the treatment group's non-epithelialized area reduction percentage still had a good value. It showed in every 2 days change of dressing, despite of its reduced effectiveness, honey still gave relatively good value. These findings were useful in wound treatment when everyday change of dressing was difficult to be done due to patient's immobility.

Better percentage of non-epithelialized area reduction on control group was due to the osmolality of honey that was highly maintained by everyday change of dressing and the renewal effect of antimicrobial and active ingredients of honey.[3,5]

Change of dressing once every two days had given good result despite of its statistically significant difference with change of dressing once a day. The maintained moisture with the use of transparent dressing and the type of wound which was acute uninfected wound with minimal exudate contributed to the good result.[3,6]

CONCLUSION

Partial thickness wound on this study were analog with other partial thickness wound, as long as they were uninfected and had minimal exudate. The mean percentage of non-epithelialized area reduction with

changing of honey dressing everyday and every two days were statistically significant. In every 2 days change of dressing, despite of reduced effectiveness, honey still gave the good result. In uninfected partial thickness wound, change of dressing can be done every two days, but in infected wound, the changing interval should be shortened. This method is useful for partial thickness wound when everyday change of dressing is difficult to be done.

Gentur Sudjatmiko, MD
Plastic Surgery Division
Cipto Mangunkusumo General National Hospital
dr_gentur@yahoo.co.id

REFERENCES

1. Jull AB, Rodgers A, Walker N. Honey as a topical treatment for wounds. Cochrane Database of Systematic Reviews 2008, Issue 4. Art. No.: CD005083. DOI: 10.1002/14651858.CD005083.pub2.
2. Wound and Skin Care Clinical Guidelines. Vancouver Island Health Authority. April 2007;8:1-7.
3. Adifitrian T, Sudjatmiko G. The role of honey application and transparent dressing in epithelialization time of split thickness skin graft donor site. J Plast Rekonstruksi. 2012; 1(3):333-37.
4. Jessup RL. What is the Best Method for Assessing the Rate of Wound Healing? A Comparison of 3 Mathematical Formulas. Wound care J. 2006;19(3): 138-46.
5. http://mvh.sr.unh.edu/software/software.htm
6. Diah A, Sudjatmiko G. Antibacterial effect of local honey against P.aeruginosa, S.aureus and MRSA. J Plast Rekonstruksi. 2012; 1(2):177-81.