

BURN

Randomized Control Trial Comparing Moist Exposed Burn Ointment and Honey as Dressings Agents in Patients with Second -Degree Burns

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Background: Many topical agents are available for the treatment of partial thickness burns. We examined Moist Exposed Burn Ointment (MEBO) and honey as dressing agents; regarding their natural antibacterial, anti-inflammatory, and wound healing properties. They have also been proven to be superior than silver sulphadiazine in treating burn wound.

Methods: A total of 34 patients were randomly allocated into MEBO group and Indonesian local honey group. The dressings are changed daily, with corresponding interventions applied. The depth and extent of burn wounds were assessed upon patient's admission and once a week for two weeks. Pain level was evaluated using the Numeric Rating Scale (NRS). The wound swabs were cultured weekly to obtain microorganisms profile. The cost-per-day of each group were counted.

Result: Acute partial thickness burn in MEBO group showed faster healing compared to honey group. NRS scores for pain were also lower in MEBO group. MEBO was found to be more effective in decreasing bacterial colonization. Cost of treating wound using MEBO until complete healing was also lesser than local honey.

Conclusions: As topical agent to treat partial thickness burns, MEBO is superior compared to local honey due to faster healing, better pain relief, fewer bacterial colonization and the more cost-effective usage.

Keywords: MEBO, Honey, second degree burns, epithelization, pain scale, bacterial colonization, cost-effectiveness

Latar Belakang: Terdapat banyak agen topikal yang tersedia untuk perawatan partial thickness burns. Kami menguji Moist Exposed Burn Ointment (MEBO) dan madu sebagai dressings agents; dengan mengetahui sifat-sifat antibakteri, anti inflamasi, dan penyembuhan luka. Agen tersebut juga telah terbukti lebih baik daripada silver sulphadiazine dalam perawatan luka bakar

Metode: Total 34 pasien dibagi secara acak ke dalam grup MEBO dan grup madu lokal Indonesia. Dressings diganti setiap harinya, dengan dilakukan intervensi yang sesuai. Kedalaman dan luas luka bakar dinilai pada saat pasien datang ke rumah sakit dan sekali seminggu selama dua minggu. Tingkat nyeri dinilai menggunakan Numeric Rating Scale (NRS). Dilakukan kultur dari swab luka setiap minggunya untuk mengetahui profil mikroorganisme. Dilakukan penghitungan biaya perawatan per hari dari setiap grup.

Hasil: Pasien dengan acute partial thickness burn pada grup MEBO menunjukkan penyembuhan yang lebih cepat dibandingkan dengan grup madu. Skor NRS untuk nyeri juga lebih rendah pada grup MEBO. MEBO lebih efektif dalam mengurangi kolonisasi bakteri. Biaya perawatan luka dengan MEBO sampai penyembuhan komplit lebih rendah dibanding madu.

Kesimpulan: Dalam perawatan partial thickness burns, MEBO lebih superior dibanding dengan madu lokal karena menyebabkan penyembuhan luka lebih cepat, peredaan nyeri yang lebih baik, kolonisasi bakteri yang lebih sedikit, dan penggunaan biaya perawatan yang lebih efektif.

Kata Kunci: MEBO, Honey, second degree burns, epithelization, pain scale, bacterial colonization, cost-effectiveness

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Many techniques are available for the local treatment of partial thickness burns. Examples include paraffin gauze, used either singly or combination with topical silver-based antibacterial creams¹⁻⁵, and alternative remedies

with herbs, aloe vera, or honey.⁶

Moist exposed burn ointment (MEBO) - an oil based ointment containing sesame oil, beta-sitosterol, beberine, and other small quantities of plant ingredients developed at China National Science and Technology Centre

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in Beijing, China, in 1989 – has been proposed as the ideal burn wound treatment.^{7,8} The manufacturers of MEBO claim that it accelerates healing, inhibits bacterial growth, has analgesic effects, and prevents burn wound scarring.⁹ MEBO's exact mechanism of action has not been fully elucidated, but it is thought that this oil-based ointment provides a moist environment for epithelial regeneration to occur, with the added anti-inflammatory effects of beta-sitosterol and the antibacterial effects of berber

Honey achieves its positive healing effects by reducing inflammation and the bacterial burden, debriding necrotic tissue, enhancing angiogenesis, granulation, and epithelialization.¹⁰⁻²⁰ Other attributes are that it reduces edema and pain due to its high osmolarity. Its antibacterial properties are due to the production of enzymatically generated hydrogen peroxide at a very low but continuous level. Honey also causes cell stimulation and deodorizes malodorous wounds and is non-adherent.²¹⁻³

In review of wounds treated with honey, harmful effects were noted, where honey induced pain, possibly due to its acidity or high osmotic potential.²³

The present work is a prospective comparative randomized clinical study of MEBO and honey dressing for the management of the acute partial - thickness burns in patients with less 25% body surface area (BSA) burn admitted to Burn Unit, Jakarta, in order to evaluate the impact of this regimen on the outcome of such patients.

METHODS

The study had been conducted in randomized double blinded clinical trial design. Study samples were collected from Cipto Mangunkusumo Hospital. Patients had been recruited between August 2011 and January 2012, who had come to the Burns Center at Cipto Mangunkusumo Hospital with acute partial thickness burns and total burn area of less than 30% BSA. The samples were collected by method of convenience sampling. Thirty four patients were recruited with the inclusion criteria as follows: male or female ranged from 6 to 80 years old of age, acute partial thickness burns (< 48 hours post trauma) with total burns of less than 30% BSA, and presented with no inhalation injury. Subjects are excluded from the study when there are indications of product intolerance, third degree burn wound or more than 30% BSA, known or suspected malignancy,

diabetes and immunosuppression, malnutrition state, or exposure of corticosteroid therapy.

The patients were allocated randomly into two groups. Each group contained 17 patients. In the MEBO group, we used moist bandage therapy method (closed method). The wounds are cleansed with normal saline gauze. MEBO is smeared successively onto the wounds at 2 mm in thickness, then the wound was covered with 2 layers of MEBO gauze (MEBO mixed with sterile gauze until the gauze is fully stained with MEBO). According to the wound condition, we covered the wound with 1,5 – 3 cm thick cotton dressing (the thickness of cotton dressing varied depending on stages of wound, amount of exudates and environmental temperature), and then adhesive tape or elastic bandage were applied to fix the dressing with low pressure. Dressing was changed once or twice a day according to the wound manifestations and the amount of exudates. Excision and skin grafting are carried out on deep dermal wounds that showed minimal signs of healing after 14 days.

In the group 2, natural undiluted unprocessed honey is applied on the wound, then in quantities of 20 g (15 – 20 ml) of honey to a 10x15 cm dressing (2 layers) to the surface of the burn wound depending on its size, after the burn wounds had been washed with normal saline. The source of honey is unifloral. The dressings were changed and the wounds inspected once or twice a day until healing. Following the application of honey, the wounds were covered with dry sterile gauze and bandaged. The frequency of dressing changes depends on how rapidly the honey is diluted by the exudate, which declines as treatment progresses. The wounds are observed for evidence of infection, excessive exudate, or leakage until they healed. The depth and extent of the injury is assessed and mapped using a Lund and Browder Chart to determine the burns' BSA. Photographs of the burns were taken using a 12,1 megapixel camera from a distance of 20-50 cm depending on the size of burn area. The BSA chart and photographs of the burn area are repeated at day 5, thereafter every 3 days and upon discharge. These photographs are then assessed by a senior burn surgeon who is not involved in the management of these cases.

All patients are assessed for pain by a registered burn nurse immediately prior to randomization. This is carried out using a verbal numerical rating scale (VNRS) similar to a visual analogue scale (VAS). A numerical scale from 1 to 10 was used: 0=no pain; 1-2=slight pain;

3-4=mild pain; 5=moderate pain; 6-9=moderately severe pain; 10=severe pain. This verbal assessment was repeated 3 times daily: once upon awakening, immediately following first dressing of the wound, and approximately 8 hours later in the day. These assessments are continued until the final dressing before patient was discharged. The wounds are swabbed weekly for routine aerobic bacteriology examination.

A clinical assessment is made daily for the presence of fever and/or reddening of the wound, which indicates infection, and then blood, urine samples and wound cultures are taken for qualitative bacteriologic examination. Quantitative and qualitative assessments of colony-forming units are performed.

The major end points are defined as time to 100% of the observed burn wound region healing, the postdressing pain assessment at 14 days post-randomization, and the infection rates. Patients are considered for discharge once 100% of the observed burn wound is healed.

Rate of epithelialization, level of pain and cost of hospitalization were analyzed using Mann Whitney Test. Bacterial identification and colonization were analyzed using Chi square test. The study design is two-group-prospective study, comparison of the benefits of MEBO application and honey dressing will be analyzed using independent T test and significant if the p value is less than 0.05. Hypothesis testing in this study will be done using SPSS 20.0 to test the significant difference between the two groups.

RESULT

Distributions of bacterial identification in the first week were *Proteus mirabilis* in 20 people (58.8%), whereas *Ps.Aeruginosa* was found in 8 people (23.5%). We did not find any *Kl.Pneumonas*, *Stap.epidermis* and *Providencia Snarti*. Whereas bacterial identification in the second week were *Prot.Mirabilis* in 13 people (38,2%), two patients had *Kl.Ozaenae*, *Stap.epidermis*, dan *Providencia Snarti* (5,9%), there was no *Ps.Aeruginosa* found.

Mean of epithelialization were assessed and results showed significant differences between Honey and MEBO group with p value ≤ 0.05. In the honey group, mean epithelialization rate was 13,58% on the first week and 75,29% on the second week. While at MEBO group, 25,44% on the first week and 99,26% on the second week (Table 1). Pain scale between Honey and MEBO showed significant differences with p-value ≤ 0.05. MEBO showed to have a better pain scale compared to Honey in the first week and second week of treatment (Table 2). Bacterial colonization decreased significantly in MEBO group compared to Honey in first week and second week of treatment (Table 3). The cost of the daily topical agent to dress the burn wound was significantly higher with MEBO (Rp. 2.075.294,-) than Honey (Rp. 449.571,-). On the other hand, the mean cost of both hospitalization and consumables per patient was lower in MEBO by mean of Rp. 6.345.000,- with 2 weeks hospitalization compared to Honey by mean of 6.435.355,- (Figure 1).

Table 1. Comparison of mean epithelialization between the Honey and MEBO

	Group				P Value*)
	Honey		MEBO		
*) Mann Whitney Test	Mean (SD)	Median (range)	Mean (SD)	Median (range)	
Epithelialization 1 st week	13,58(12,53)	6(0,00-40,00)	25,44(19,31)	18,75(1,0-62,5)	0,022
Epithelialization 2 nd week	75,29(6,87)	75(68,75-85,0)	99,26(0,74)	99(98-100)	<0,001
Changes in epithelialization	61,70(14,64)	65(37,50-85,00)	73,82(18,90)	81,25(37,5-98,0)	0,002

Table 2. Comparison of the pain scale between Honey and MEBO

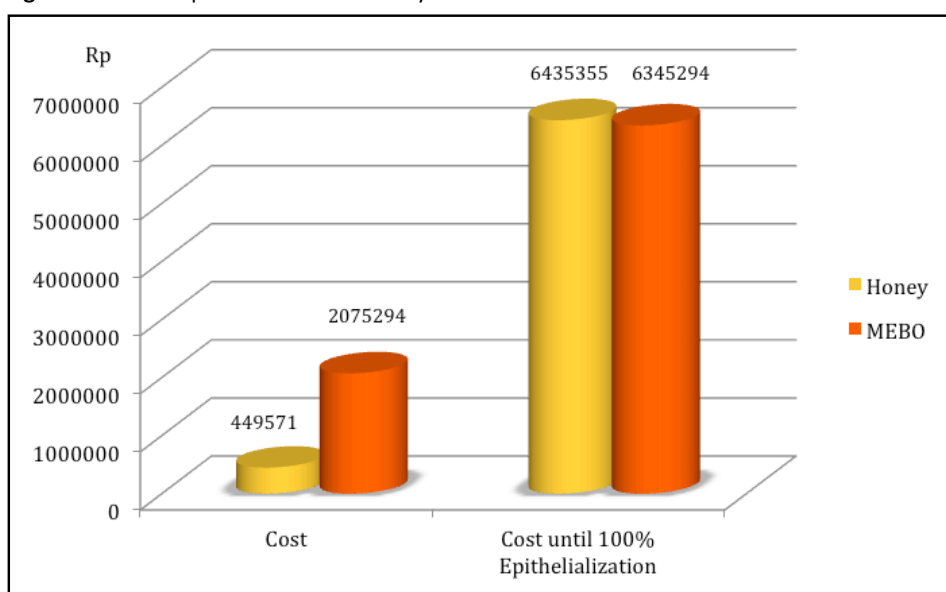
	Group				P Value*)
	Honey		MEBO		
	Mean (SD)	Median (range)	Mean (SD)	Median (range)	
Pain Scale I	9,35(0,86)	10,00(8-10)	5,41(0,79)	5,00(4-7)	<0,001
Pain Scale II	5,65(1,11)	5,00(4-7)	1,12(0,33)	1,00(1-2)	<0,001
Changes in pain scale	3,71(0,85)	3,00(3-5)	4,29(0,77)	4,00(3-6)	0,038



Table 3. Comparison of bacterial colonization between the Honey and MEBO

	1 st week				P value	2 nd week				P value
	Honey		MEBO			Honey		MEBO		
	n	%	n	%		n	%	n	%	
Bacterial colonization					<0,001					<0,001
+1 (10.000 CFU)	-	-	-	-		0	0,00	10	58,8	
+2 (20.000 CFU)	-	-	-	-		2	11,8	5	29,4	
+3 (30.000 CFU)	2	11,8	15	88,2		9	52,9	2	11,8	
+4 (100.000 CFU)	15	88,2	2	11,8		6	35,3	0	0,00	

Figure 1. Cost comparison between Honey and MEBO



DISCUSSION

Although the approach to burn care management is relatively standard in many parts of the world, in China an alternative method that includes MEBO and the use of honey in India are gaining popularity. Many trials had been done in those countries, and the results showed that both MEBO and honey are superior from conventional methods using silver in many aspects. Because of that reason, this study was held to compare MEBO and honey in the management of patients with second degree burns, randomized control trial.

On application of the local agent, superficial partial-thickness burn healed faster with MEBO with shorter hospital stay than with honey medication (Table 1). On the honey group, mean epithelialization rate was 13,58% on the first week and 75,29% on the second week. While at MEBO group, 25,44% on the first

week and 99,26% on the second week.

We also record significant differences in the local agent's analgesic effect in pain scale between Honey and MEBO group and also there is a significant difference between the pain scale 1st week and 2nd (Table 2).

MEBO analgesic effect was tested and confirmed in earlier studies, in which Ang et al. reported that MEBO exerted a greater analgesic effect than 1% SSD cream, especially in the first five days post-burn, which was advantageous for the modulation of the acute immune response. Molan,2001 reported that honey treatment compared to SSD cream, better pain relief. It is still unclear why honey causes pain, it might be a result of its low pH. Also, honey's high osmolarity may result in a pulling sensation after application. There is anecdotal evidence that mixing honey with cream can reduce the pain but there is no clinical evidence to support this.³

In the treatment of burn, the prevention

and treatment of infection are major aims. In this prospective study, there are significant differences in bacterial colonization between Honey and MEBO in the 1st and 2nd week (Table 3).

The antibacterial properties of honey are attributed to its low pH(3,6), its hygroscopic property and an inhibit factor which appears to be hydrogen peroxide, an end product of the enzym reaction of glucose oxidase (from the bee) with glucose in diluted honey. The other trials, elaborated the practicality of MEBO therapy and its effectiveness in preventing burn wound sepsis. Initial swab cultures were positive in 29% of the immediately treated patients and 92% in patients treated on the third post burn day. By the second week, bacterial colonization dropped to 5% and 23% respectively.

The hospital and consumable costs and the dressing time of wounds are summarized in Figure 1. The cost of the daily topical agent to dress the burn wound was significantly higher with MEBO than honey (Rp.2.075.294,-) versus Rp.449.571,-). But on the other hand, the mean cost of both hospitalization and consumables per patient was lower with MEBO, by mean Rp. 5.950.000,- (2 weeks hospitalization). Overall, the mean cost per patient for MEBO was reduced compared with honey treatment.

SUMMARY

As topical agent to treat partial thickness burn, this study showed that MEBO is superior compared to local honey application; in terms of faster healing, better pain relief, fewer bacterial colonization and the cost was more effective. We suggest that MEBO can be used as one of modalities to manage second-degree burn wound.

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