

## Efektivitas Campuran Povidone Iodine dan Madu dalam Penyembuhan Laserasi

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### ABSTRAK

**Pendahuluan.** Pasien dengan luka laserasi pada daerah kaki umumnya mengalami kecelakaan lalu lintas. Berdasarkan mekanisme trauma, luka tersebut digolongkan menjadi luka kotor terkontaminasi. Pasien mendapat tindakan debridemen di kamar operasi sesuai dengan kondisi klinis kemudian dirawat di ruangan. Akan tetapi, keadaan klinis luka tersebut kurang optimal untuk proses penyembuhan sehingga memerlukan tindakan lanjut untuk menurunkan risiko infeksi pasca operasi. Madu sudah lama digunakan sebagai bahan perawatan luka bakar dan terinfeksi karena efek antimikrobal, angiogenik, dan anti-inflamasinya. Oleh karena itu, tujuan penelitian ini adalah mengetahui efektivitas campuran povidone iodine dan madu dalam penyembuhan laserasi.

**Cara kerja.** Pada uji klinis ini, digunakan 20 sampel yang dibagi menjadi dua kelompok secara acak. Satu grup diberikan campuran povidone-iodine dan madu, sedangkan grup lain diberikan povidone iodine saja. Proses penyembuhan luka diobservasi dengan menilai luas jaringan granulasi, jumlah cairan eksudat selama delapan hari perawatan, dan jumlah *colony forming unit (CFU)* pada hari pertama di Instalasi Gawat Darurat dan hari kedelapan perawatan. Hasil dianalisis dengan *Wilcoxon Sign Rank Test* dan *Mann Whitney Test*.

**Hasil.** Terdapat perbedaan bermakna antara kelompok I dan II dalam luas jaringan granulasi dan jumlah cairan eksudat. Sementara itu tidak terdapat perbedaan bermakna dalam jumlah *colony forming unit (CFU)* antara kedua grup.

**Simpulan.** Penggunaan campuran povidone iodine dengan madu lebih efektif dibandingkan dengan povidone iodine saja untuk proses penyembuhan luka laserasi.

**Kata kunci :** campuran povidone iodine 5% dengan madu murni, luas jaringan granulasi, jumlah cairan eksudat, *colony forming unit*

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## Efficacy of Povidone Iodine and Honey Mixture in Laceration Recovery

### ABSTRACT

**Introduction.** Patients with lacerations to feet are usually involved in motor vehicle accidents. Based on trauma mechanism, the wound may be classified as a dirty contaminated wound. Patients are taken to operating theater for debridement then followed by wound care at ward. Clinical conditions of such wounds frequently are not optimal for healing process and may require further treatment to decrease the risk for postoperative infection. Honey has been long used as a material for dressing of burn wounds and infected wounds because of its antimicrobial, angiogenetic, and anti-inflammatory properties. Thus the aim of the study is determine efficacy of povidone iodine mixed with honey in laceration recovery.

**Materials and methods.** This clinical study had twenty samples which were randomly assigned into two groups. One group have the wound treated using a mixture of 5% povidone iodine solution and pure honey, while the other group is treated using 5% povidone iodine only. The wound healing process was observed by evaluating granulation tissue, amount of exudates during the eight days of care, and the number of colony forming units (CFUs) from samples taken on admission in the ER and another taken at the eighth day of care. Statistical analysis is performed using the Wilcoxon Sign Rank Test and Mann Whitney Test.

**Results.** The analysis revealed a significant difference between the group I and group II in the amount of granulation and exudate production, while there is no significant difference in number of CFUs in both groups.

**Conclusion.** The mixture of 5% povidone iodine and pure honey are more effective compared to 5% povidone iodine only for the healing process of lacerations of the dorsal aspect of the right foot.

**Key words:** mixture of 5% povidone iodine with pure honey, amount of granulation, amount of exudates, colony forming units

### Introduction

Injury to the feet can affect activity, health and emotional status of patients. Turchin reported that in patients with multiple organ injuries would demonstrate more state deteriorated significantly when accompanied by injury to the foot.<sup>1</sup>

Within six months from January 2008 to June 2008 the number of injuries to the foot of a laceration injury with or without fractures who come to the emergency room (ER) Hasan Sadikin Hospital amounted to 177 cases. While in Edinburgh Scotland 9% of the total 760 cases of the same over a period of 6 years.<sup>1</sup> Lacerations on leg most often found in motorcyclists caused by motor vehicle accident. Based on trauma mechanism, the wound is classified into a dirty contaminated wound.<sup>1,2</sup>

Such patients be stabilized in ER, debridement in the operating room (OR) according to the clinical condition. Wound care will be continued in ward. However, wound healing process are probably less than optimal because of the wound type. Thus it requires further action to decrease risk of infection postoperation.<sup>1</sup>

Since 18th century in England and India, honey has long been used as a treatment for infected wounds. The use of pure honey, the one which is not diluted, is to treat a wide range of injuries including chronic infection with necrosis of tissue in the perineum (Fournier's gangrene).<sup>4</sup> It has also been used for treatment of third-degree burns and infected wounds which shows decrease in the number of germs cultured, wet and necrotic tissue, exudate fluid, and foul-smelling.<sup>1-12</sup>

Therefore the aim of the study is to determine the efficacy of povidone iodine with honey mixture in laceration healing.

**Materials and methods**

This study was conducted from February until June 2011. Twenty subjects were recruited. Inclusion criterias were aged 16-45 years, laceration located on the dorsal of the foot with or without open fractures and have been stabilized using external fixation or external support, absence of systemic and metabolism disorder, chronic disease, and not undergone steroid treatment, laceration covered with secondary wound closure techniques.

Exclusion criterias were allergy to povidone iodine, refusing to participate, experiencing sepsis during treatment, going to be undergone secondary action such as amputation. Subjects of research were also asked for informed consent.

Sample for microbiology culture was taken at ER by swab from the bottom of the wound using sterile cotton sticks. Sample was sent to the Microbiology Laboratory Faculty of Medicine Research Unit, Padjadjaran University.

Subjects were undergone debridement and external fixation stabilization or support outside, and also received first generation cephalosporin antibiotic treatment. Then they were assigned into two groups. Ten patients were given povidone iodine 5% (Betadine® manufactured by Mahakam Beta Farma Indonesia) mixed with honey (Madu Murni Perhutani® Indonesia) while the others were given povidone iodine 5% only. Sterile instruments were used for wound care.

Wound was irrigated with 0.9% NaCl and also mixture povidone iodine 5%: pure honey = 1:1 stirred at room temperature until homogeneous. Wound care is done twice a day. Every time wound care was conducted, granulation tissue, amount of fluid exudates (1 gauze = 10 ml), the signs of inflammation were evaluated.

On day-8 treatment, granulation tissues, fluid exudates, signs of inflammation and colony forming units (CFU) were assessed. Exudate production was assessed by counting the number of gauze for wound dressing getting wet (1 gauze=10 cc).

Colony count parameter according to Shen et al, can be expected to occur if the skin infection at the wound edges contain germs >10<sup>5</sup> CFU/mL or bacteria contained in soft tissues.<sup>2</sup> Counting the number of bacteria carried on the 8th day directly by counting number of bacteria colonies one by one based on the colony of germs that

grow on blood agar plates after 24 hours.

**Results**

For the baseline characteristics, there is no significant difference in gender and average age of subjects in both group (p> 0.05) as shown in table 1.

Table 1. Subjects distribution by sex and age

Characteristic	Group		p
	Povidone iodine 5%+Pure honey	Povidone Iodine 5%	
Male	8 (40 %)	7 (35 %)	0.500*
Female	2 (10 %)	3 (15 %)	
Age	28.4 (7,8)	25.0 (7.0)	0.353**

\*  $\chi^2$  test; \*\* Mann-Whitney test

The first variable observed in this study is extension of granulation tissue measured as eight times with interval one day. Average area of granulation tissue is increasing in both groups each day. The results of granulation tissue measurements in both treatment groups are presented in table 2.

There are significant differences in both groups results on each day (p <0.01). Overall we can conclude the average area of granulation tissue are increasing for both groups. Increasing average area of granulation tissues in mixture group are faster than povidone iodine-only group.

Figure 1 shows decrement of wound exudate for both groups. Colonies of microorganisms on the first day of measurement results showed the results as presented in

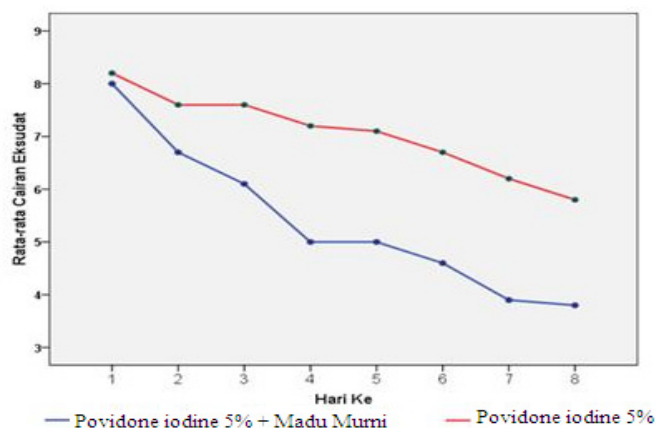


Figure 1. Average amount of wound exudates

Table 2. Average granulation tissue for both treatment groups

Day	Povidone iodine 5%+Pure Honey		Povidone iodine 5%	
	Mean	SD	Mean	SD
1	2.50	2.635	1.00	2.108
2	10.00	4.082	3.50	2.415
3	19.00	6.992	9.70	3.268
4	26.00	8.097	13.00	3.496
5	31.00	8.756	15.50	4.378
6	39.50	10.124	19.50	4.378
7	48.00	10.055	23.00	6.749
8	55.50	10.124	27.00	5.869

table 3. While on the eighth day, number of colonies in both groups <math>10^5</math> CFU.

**Discussions**

The difference in granulation tissue area shows a highly significant result (p <math>0.01</math>) with a magnitude difference of the difference between the two groups (53.00 to 26.00) = 27.00). It means that using mixture of povidone iodine 5% and pure honey can provoke faster granulation tissues. Thus we hope the mixture can heal the wound faster.

There is also a significant difference in the amount of fluid exudate in both groups (p <math>0.01</math>) with the magnitude of the difference the difference between the two the rate of [4.20 to 2.40] = 1.80). Thus it means that using the mixture can reduce amount of exudates more effective than the povidone-iodine only.

**Conclusions**

Mixture of povidone-iodine and pure honey is more effective than povidone-iodine only in laceration healing process.

Table 3. Number of microorganisms colonies in both groups on day 1

Germ Colonies	Group		P
	Povidone iodine 5% + Pure Honey	Povidone iodine 5%	
<math><10^5</math>	3 (15 %)	4 (20 %)	0.500*
> <math&gt;10^5&lt; math&gt;<="" td=""> <td>7 (35 %)</td> <td>6 (30 %)</td> </math&gt;10^5&lt;>	7 (35 %)	6 (30 %)	

\*  $\chi^2$  test

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